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# JOURNAL OF THE PROCEEDINGS

OF THE

## LINNEAN SOCIETY OF LONDON.

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Description of a curious Form of *Dipterous Larva*. By E. HART VINEN, Esq., M.D., F.L.S.

[Read Feb. 21, 1861.]

IN the early part of the year 1855, while examining with the microscope some water taken from a pool near my house at Bayswater, I noticed some small animals moving about with an active wriggling motion, which, as I believe them to be peculiar, I venture to introduce to the notice of the Society. They were very few in number, and I mounted some specimens in Canada balsam for future observation.

My first casual examination gave me the idea that they were mere larval conditions of some insect; a belief which was strengthened by the most prominent feature of the animal—a beautiful tuft of hairs (possibly respiratory organs) at the tail—and under this impression they were put aside with some other objects, but in consequence of more pressing occupation were for a long time neglected.

I have since consulted several entomologists, and finding their opinions to coincide with my own, I have thought it might be useful to give the following description:—

Body composed of thirteen segments, the four anterior comparatively short; cephalic joint narrow, truncated in front; eye-spots

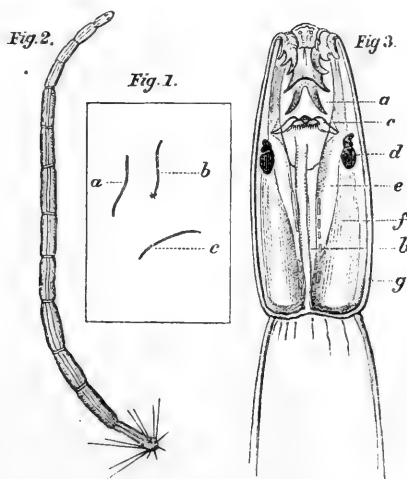
double, placed near the lateral margins and below the anterior third of the segment. Caudal segment furnished with twelve spines or setæ, eight long and four short; the former being retroverted and disposed in pairs, alternating with the latter, which are somewhat nearer the extremity.

In addition to these characters, I may remark that the head appears to be supplied with a complicated buccal apparatus, but the preservative medium has rendered the parts so transparent that I refrain from hazarding a precise description of its several parts. Moreover, in different examples these appearances are dissimilar, whilst the cephalic segment itself is proportionally longer in some cases than in others. The eye-spots are always distinct, more or less elongated, each evidently consisting of two separate pigment-masses, the line of demarcation being clearly defined. In the specimen figured *a* on the slide, the eyes are much more elongated and more uniform in outline; being, nevertheless, thicker behind than in front. Connected with the eyes and buccal apparatus there are two laterally disposed muscular masses, which almost fill up the longitudinal halves of the cephalic segment. The buccal cavity itself is tolerably well defined, being funnel-shaped and apparently closed behind. The œsophagus takes its origin at the upper and back part of the sac, immediately behind a peculiar form of dental apparatus which guards the pharyngeal opening. This structure forcibly reminds one of the gastric teeth found in decapodous Crustaceans, and appears to consist of a central and two lateral horny pieces, which, acting upon one another, serve to comminute the food only partially broken up by the buccal organs. The intestinal canal can be traced throughout the entire series of segments, and on either side of it runs a conspicuous vessel filled with highly coloured blood. I have not observed any trace of reproductive organs, a circumstance which alone renders it highly probable that we have to do with a larval insect. The last or thirteenth segment is considerably narrower than those of the body proper. The eight *long* spines are jointed at the base, where they are comparatively thick, becoming gradually attenuated towards the tip; the segment itself is also slightly increased in breadth at the lower end. The length of each spine is somewhat less than that of the caudal segment, and fully four times longer than those of the smaller series placed nearer to the end of the segment; these latter project at a right angle from the tip, and do not appear capable of retroversion.



In the above description I have purposely refrained from entering into very minute particulars, owing to the imperfection observable in my preserved specimens. I have ventured, however, to relate these few particulars, hoping at some future time to analyse more accurately fresh and living examples, should I have the good fortune to meet with them.

I cannot conclude these remarks without expressing my thanks to my friend Dr. T. Spencer Cobbold for his excellent drawings, from which the accompanying figures have been copied.



#### DESCRIPTION OF CUT AS REDUCED.

Fig. 1. Three larvæ (*a*, *b*, *c*), of the natural size.

Fig. 2. The specimen marked *c*,  $\times 8$  diameters.

Fig. 3. Cephalic segment of the specimen (marked *a*): *a*, buccal cavity; *b*, cesophagus; *c*, pharyngeal teeth; *d*, eyes; *e*, muscles of the mouth and pharynx; *f*, muscles to the eyes; *g*, integument showing a double contour,  $\times$  about 70 diameters.

Feb. 21st, 1861.

Catalogue of the Dipterous Insects collected at Gilolo, Ternate, and Ceram, by Mr. R. WALLACE, with Descriptions of New Species. By FRANCIS WALKER, Esq., F.L.S.

[Read Feb. 21, 1861.]

GILOLO.

Fam. TIPULIDÆ, *Haliday*.

Gen. LIMNOBIA, *Meigen*.

The following species belongs to Meigen's Div. D. *Diptera*, vol. i. p. 122, pl. 4. f. 15.

1. LIMNOBIA EUCHROMA. *Fœm.* Læte ochracea, antennis, abdominis fasciis quatuor pedibusque nigris, alis nigricantibus, halteribus apice nigris.

*Female.* Bright ochraceous; antennæ black, setaceous, submoniliform, minutely setose, a little longer than the head; abdomen with four black bands, 2nd band much broader than the 1st and than the 3rd, the latter angular in front, 4th band much broader than the 2nd; legs black, slender; wings blackish; veins and knobs of the halteres black. Length of the body 6 lines; of the wings 12 lines.

Fam. STRATIOMIDÆ, *Haliday*.

Gen. PTILOCERA, *Wied.*

2. Ptilocera 4-dentata, *Fabr.* See Vol. I. p. 7.

Gen. STRATIOMYS, *Geoffr.*

3. STRATIOMYS CINCTILINEA, n. s. *Fœm.* Nigra, capite anthracino nitente, peristomatis lateribus, antennis basi, scutelli dentibus duobus abdominisque margine flavescentibus, pedibus halteribusque flavis, alis subcinereis.

*Female.* Black; head coal-black, shining; peristoma yellowish on each side; antennæ yellowish at the base, much shorter than the breadth of the head; thorax with slightly gilded pubescence; scutellum with two pale yellowish teeth; abdomen with a narrower yellowish border; legs and halteres yellow; wings slightly cinereous; veins black. Length of the body 4 lines; of the wings 7 lines.

Gen. CLITELLARIA, *Meigen*.

4. Clitellaria bivittata, *Fabr.* See Vol. I. p. 7.

Gen. SARGUS, *Fabr.*

5. Sargus tarsalis, *Walk.* See Vol. V. p. 274.
6. Sargus tibialis, *Walk.* See Vol. V. p. 273.

Gen. MASSICYTA, *Walk.*

7. *Massicyta cerioides*, *Walk.* See Vol. III. p. 78.

Gen. SOLVA, *Walk.*

8. *SOLVA HYBOTOIDES*, n. s. *Mas et Fæm.* Nigra, antennis basi pallide flavis, thoracis lineis lateralibus scutello abdomine pedibusque luteis (*mas*) aut flavis (*fæm.*), abdominis disco fæm. nigro, tibiis posticis nigris, alis cinereis.

*Male and Female.* Black; mouth and palpi pale yellow; antennæ lanceolate, shorter than the breadth of the head, pale yellow at the base; thorax with a humeral callus and an elevated line along each side and the scutellum luteous in the male, pale yellow in the female; pubescence slightly gilded; abdomen luteous, disk black in the female, with the exception of the hind borders of the segments; legs luteous in the male, pale yellow in the female; hind femora incrassated; hind tibiæ black, curved; middle tibiæ black in the middle; wings cinereous; veins black; halteres pale. Length of the body 3-4 lines; of the wings 6-8 lines.

Fam. ASILIDÆ, *Leach.*Subfam. DASYPOGONITES, *Walk.*Gen. DASYPOGON, *Fabr.*

9. *DASYPOGON SOLUTUS*, n. s. *Mas.* Niger, capite thoraceque auratis, antennis linearibus, thorace vittis quatuor pectoreque fasciis duabus nigris, abdomine rufo clavato apicem versus piceo fascia basali nigra, pedibus halteribusque rufis, alis cinereis apice nigricanti-cinereis.

*Male.* Black; head with pale gilded tomentum; epistoma flat, with a few pale bristles; eyes with very small facets. Antennæ linear, nearly as long as the breadth of the head; thorax and pectus with pale gilded tomentum; thorax with four black stripes, the lateral pair short, broad, obliquely intersected; pectus with two black bands; abdomen red, clavate, with a black band near the base, the four last segments with slightly piceous disks; legs red, robust; femora with a few stout black bristles; tarsi black towards the tips; wings cinereous, blackish cinereous towards the tips and along the adjoining part of the hind border; veins black, tawny at the base; halteres red. Length of the body 7 lines; of the wings 12 lines.

10. *DASYPOGON SEMIFILATUS*, n. s. *Fæm.* Niger, capite thoraceque auratis, thorace vittis quatuor latis pectoreque fasciis duabus nigris, abdomine clavato fasciis tribus anticis fulvis, pedibus rufis, alis cinereis, halteribus flavescentibus.

*Female.* Black; head with gilded tomentum, cinereous behind; epistoma flat, with two pale bristles; palpi short; antennæ mutilated; thorax and pectus with gilded tomentum, the former with four broad black stripes, the latter with two black bands; abdomen clavate, about twice the length of the thorax, very slender towards the base, where it is dilated; fore part with three tawny bands, 3rd band interrupted in the middle, dilated on each side; legs red, slender; tarsi black; posterior femora and tibiæ with a broad black middle band; wings cinereous; veins black; halteres yellowish. Length of the body 6 lines; of the wings 10 lines.

Subfam. LAPHRITES, *Walk.*

Gen. LAPHRIA, *Fabr.*

11. *Laphria tristis*, *Dol.* See Vol. V. p. 146.
12. *Laphria comes*, *Walk.* See Vol. III. p. 85.
13. *Laphria conveniens*, *Walk.* See Vol. V. p. 278.
14. LAPHRIA SETIPES, n. s. *Mas.* Cyanea, capite argenteo, antennarum articulo 3<sup>o</sup> lineari, thoracis lateribus anticis pectoreque albo tomentosus, abdomine purpureo longo, pedibus purpureis longissime setosis, femoribus posticis incrassatis, alis nigricantibus dimidio basali cinereo, halteribus albis.  
*Male.* Blue; head silvery in front, thickly clothed beneath with white hairs; mystax with a few black bristles; third joint of the antennæ linear, conical at the tip; pectus and sides of the thorax in front with white tomentum; abdomen purple, slender, linear, about twice the length of the thorax; legs purple, thickly clothed to the tips of the tarsi with long black and white bristles; femora much incrassated, partly blue; wings blackish, cinereous for nearly half the length from the base; veins black; halteres white. Length of the body 8 lines; of the wings 12 lines.
15. LAPHRIA FLAGELLATA, n. s. *Mas et Fæm.* Nigra, capite aurato, antennarum articulo 3<sup>o</sup> lato fusiformi, pectore albo tomentoso, segmentorum abdominalium marginibus posticis lateralibus albis, pedibus purpureo variis, alis nigris basi cinereis. *Mas.* Abdomine purpureo.  
*Male and Female.* Blue; head brightly gilded in front, clothed beneath with white hairs; mystax with several black bristles; antennæ black, third joint broad, fusiform; pectus with white tomentum; abdomen with white tomentum on the hind borders of the segments; legs partly purple, thinly beset with black and white bristles; wings black, cinereous towards the base; veins and halteres black. *Male.* Abdomen purple. Length of the body 4½–5 lines; of the wings 8–9 lines.

Subfam. ASILITES, *Walk.*Gen. TRUPANEA, *Macq.*

16. TRUPANEA GILOLONA, n. s. *Mas et Fæm.* Nigra, capite subtus albo piloso, fronte subaurata, mystace e setis nigris albisque, thorace cinereo vittis quatuor nigris, segmentorum abdominalium marginibus posticis ventreeque cinereis, tibiis rufis apice nigris, alis cinereis strigis duabus subcostalibus sordide albidis, halteribus albidis.

*Male.* Black; head thickly clothed beneath with white hairs; front slightly gilded; epistoma prominent; mystax composed of many black and of fewer white bristles; third joint of the antennæ fusiform, about one-third of the length of the second; thorax cinereous, with four black stripes of the usual form; pectus hoary; abdomen slightly tapering from the base to the tip, about twice the length of the thorax; hind borders of the segments and underside cinereous; sexualia very small; legs stout with a few black bristles; tibiæ dark red, black towards the tips; wings dark cinereous; subcostal and radial areolets with dingy whitish stripes; veins black; halteres whitish. Length of the body 6 lines; of the wings 11 lines.

*Female.* Third joint of the antennæ fusiform, about one-fourth of the length of the arista; abdomen lanceolate, full twice the length of the thorax; apical part stylate, shining. Length of the body 9 lines; of the wings 12 lines.

Gen. ASILUS, *Linn.*

17. Asilus involutus, *Walk.* See Vol. V. p. 281.

18. ASILUS CONDECORUS, n. s. *Fæm.* Cyanescenti-niger, robustus, fronte aurata, mystace e setis plurimis nigris paucisque albis, thoracis suturis, lateribus, pectore et segmentorum abdominalium marginibus posticis canis, abdomine subplano non acuto, pedibus robustis, alis cinereis apices versus nigricantibus.

*Female.* Bluish black, stout, with black bristles; head gilded in front, thickly clothed beneath with white hairs; epistoma prominent; mystax composed of numerous black bristles and of a few white bristles; third joint of the antennæ elongate-conical, not more than one-fourth of the length of the style; pectus and sides, and sutures of the thorax with hoary tomentum; abdomen somewhat flat, slightly decreasing in breadth from the base to the tip, less than twice the length of the thorax; hind borders of the segments hoary; tip black, shining, not acute; legs stout, with slight white pubescence and with a few black bristles; wings cinereous, blackish towards the tips and along the adjoining part of the hind border; veins black; forks of the cubital vein undulating; halteres whitish. Length of the body 7 lines; of the wings 14 lines.

Gen. OMMATIUS, *Illiger.*

19. Ommatius noctifer, *Walk.* See Vol. III. p. 88.

20. *Ommatius retrahens*, *Walk.* See Vol. III. p. 88.

21. *OMMATIUS PLATYMELAS*, n. s. *Fæm.* Niger, latus, fronte aurata, thoracis lateribus subauratis, scutello cinereo, abdomine subplano, segmentorum marginibus posticis maculisque lateralibus trigonis cinereis, tibiis rufis apice nigris, alis nigris nigricante marginatis.

*Female.* Black, broad, stout; head clothed beneath with white hairs, gilded in front; epistoma flat; mystax extending to the base of the antennæ, composed of black bristles and of a few inferior white bristles; thorax slightly gilded on each side; scutellum cinereous; pectus hoary; hind borders of the segments and underside with cinereous tomentum, which forms triangular spots along each side; legs very robust, with black bristles; tibiæ red, with black tips; wings black, blackish towards the tips and along the hind border; halteres pale yellow. Length of the body 6 lines; of the wings 11 lines.

### Fam. LEPTIDÆ, *Westw.*

#### Gen. SURAGINA, *Walk.*

22. *SURAGINA SIGNIPENNIS*, n. s. *Fæm.* Nigra, thorace vittis duabus lateribusque canis, abdomine cano lanceolato apicem versus compresso, femoribus apice fulvis, tibiis rufescenti-piceis, alis cinereis fasciis duabus maculaque interiore nigricantibus, gutta adhuc interiore nigra.

*Female.* Black; head with whitish tomentum behind and beneath; thorax with two hoary stripes, which are dilated and united hindward; sides and pectus also hoary; abdomen hoary, lanceolate, compressed towards the obtuse tip, nearly twice the length of the thorax; legs long, slender; femora with tawny tips; tibiæ reddish piceous; wings cinereous, with two blackish bands, which are united on the costa and are separated obliquely hindward, second band apical; a blackish elongated subcostal spot near the inner side of the first band, and a black discal dot still nearer the base; halteres yellowish towards the base. Length of the body 6 lines; of the wings 12 lines.

### Fam. BOMBYLIDÆ, *Leach.*

#### Subfam. THEREVITES, *Walk.*

#### Gen. THEREVA, *Latr.*

23. *THEREVA CONSCITA*, n. s. *Mas.* Nigra, argenteo tomentosa, thoracis disco nigro vittis duabus interlineatis canis, abdomine fasciis sex nigris, alis cinereis apices versus nigricante nebulosis.

*Male.* Black, with silvery hoary tomentum; head silvery white in front; 3rd joint of the antennæ lanceolate, nearly as long as the 1st and 2nd together; arista extremely short; disk of the thorax black,

with two hoary interlined stripes; abdomen silvery white, nearly linear, with a short fringe along each side, and with six black bands, 1st and 2nd bands broad, 3rd very broad, 4th and 5th very slender, 6th broad, apical; femora and tibiæ with silvery white tomentum; wings cinereous, slightly and partly clouded with blackish towards the tips; veins black; halteres white. Length of the body 6 lines; of the wings 10 lines.

Subfam. BOMBYLITES, *Walk.*

Gen. ANTHRAX, *Fabr.*

24. Anthrax Pelops, *Walk.* See Vol. II. p. 90.

Fam. MUSCIDÆ, *Latr.*

Gen. MASICERA, *Macq.*

25. Masicera morio, *Dol.* See Vol. V. p. 154.

Gen. EURYGASTER, *Macq.*

26. Eurygaster ridibunda, *Walk.* See Vol. IV. p. 125.

Subfam. DEXIDES, *Walk.*

Gen. RUTILIA, *Desv.*

27. Rutilia ixoides, *Walk.* See Vol. V. p. 289.

28. RUTILIA FERVENS, var., *Walk.* See Vol. V. p. 288. *Mas.* Splendissime cyaneo-viridis, capite plagis duabus anticis testaceis trigonis frontibus, thoracis disco cupreo vittis quatuor nigris, abdomine vitta, fasciis tribus guttisque duabus apicalibus nigris, pedibus nigris, alis luridis.

Var. *Male.* Brilliant bluish green; head with a triangular testaceous patch on each side of the peristoma; frontalia deep black, widening much in front; antennæ black; arista pubescent; thorax with a cupreous disk and with four black stripes, of which the middle pair are much abbreviated hindward; abdomen with a black stripe and with three black bands, 1st band basal, 2nd and 3rd convex on each side in front, a black apical dot on each side; legs black; wings lurid; præbrachial vein forming a rounded, slightly obtuse angle at its flexure, very slightly curved inward from thence to its tip; discal transverse vein slightly undulating, parted by half its length from the border, and by more than half its length from the flexure of the præbrachial. Length of the body 7 lines; of the wings 16 lines.

29. Rutilia saturatissima, *Walk.* See Vol. V. p. 287.

30. RUTILIA SAPPHIRINA, n. s. *Mas.* Obscure purpurascenti-cyanea,

capite argenteo, frontalibus atris, thorace non vittato, abdomine nigro fasciis tribus interruptis splendidissime purpurascenti-cyaneis, tibiis posticis fimbriatis, alis cinereis basi nigris.

*Male.* Dark purplish blue; head with silvery white tomentum; frontalia deep black, widening in front; antennæ black; arista hardly pubescent; thorax not striped; abdomen black, with three interrupted brilliant purplish-blue bands; 2nd band narrower than the 1st and than the 3rd, excavated on each side of the hind border, 3rd band apical, very broad; legs black; hind tibiæ fringed; wings cinereous, black at the base; præbrachial vein forming a rounded, obtuse angle at its flexure, hardly curved inward from thence to its tip; discal transverse vein hardly undulating, parted by little more than one-fourth of its length from the border, and by hardly more than half its length from the flexure of the præbrachial, which, like it, is very near the border. Length of the body 7 lines; of the wings 16 lines.

Gen. GYMNOSTYLIA, *Macq.*

31. GYMNOSTYLIA LUTEICORNIS, n. s. *Fæm.* Nigra, cinereo-tomentosa, frontalibus atris perangustis, palpis testaceis, antennis luteis, thorace vittis quatuor nigris, abdomine fulvo fusiformi macula basali trigona, pedibus fulvis longiusculis, alis cinereis apud venas fuscescente subnebulosis.

*Female.* Black, with cinereous tomentum; head with bristles along each side of the frontalia, which are deep black, linear and very narrow; palpi testaceous; antennæ luteous, 3rd joint short; arista bare, slender; thorax with four slender black stripes; pectus hoary; abdomen tawny, fusiform, a little longer and narrower than the thorax, with a black triangular spot at the base, and with black spines at the tip; legs tawny, rather long and slender; tibiæ darker than the femora; tarsi black; wings cinereous, very slightly brownish-clouded along the veins; veins black, tawny at the base, præbrachial vein forming a very obtuse angle at its flexure, almost straight from thence to its tip; discal transverse vein almost straight, parted by a little less than its length from the border, and by a little more than its length from the flexure of the præbrachial; alulæ white. Length of the body 4 lines; of the wings 7 lines.

Subfam. SARCOPHAGIDES, *Walk.*

Gen. SARCOPHAGA, *Meigen.*

32. *Sarcophaga mendax*, *Walk.* See Vol. IV. p. 132.

Subfam. MUSCIDES, *Walk.*

Gen. MUSCA, *Linn.*

33. *Musca costalis*, *Walk.* See Vol. V. p. 159.



34. *Musca promittens*, *Walk.* See Vol. IV. p. 134.

35. *Musca obtrusa*, *Walk.* See Vol. III. p. 105.

Subfam. ANTHOMYIDES, *Walk.*

Gen. ATOMOGASTER, *Macq.*

36. ATOMOGASTER BISERIATA, n. s. *Fæm.* Cana, capite albo, frontalibus atris latiusculis, antennis nigris, thorace vittis tribus obscurioribus indistinctis, abdomine vitta nigricante maculisque sex quadratis nigris subtus testaceo, pedibus testaceis, alis cinereis.

*Female.* Hoary; head white; frontalia deep black, linear, rather broad; proboscis and palpi black, the latter slender, slightly curved; antennæ black, 3rd joint not reaching the epistoma; arista bare, stout at the base; thorax with three slender, indistinct, darker stripes; abdomen elongate-oval, testaceous beneath, with a blackish stripe, which is interrupted on the hind border of each segment, and with three quadrate black spots on each side; basal segment not spotted; legs testaceous; wings cinereous; veins black, testaceous towards the base; discal transverse vein straight, parted by about its length from the border, and by nearly twice its length from the præbrachial transverse; alulæ white. Length of the body  $2\frac{3}{4}$  lines; of the wings  $4\frac{1}{2}$  lines.

37. ATOMOGASTER TRISERIATA, n. s. *Fæm.* Schistacea, capite albo, frontalibus rufis, thorace vittis tribus obscurioribus indistinctis, abdomine maculis sex elongatis nigris, segmentis albo marginatis, femoribus apice tibiisque fulvis, alis cinereis.

*Female.* Slate-colour; head white; frontalia red, linear; thorax with three very indistinct darker stripes; abdomen fusiform, a little longer than the thorax, with three elongated black spots on each of the three last segments; hind borders of the segments white; legs black; tibiæ and tips of the femora tawny; wings cinereous; veins black, tawny at the base; discal transverse vein hardly bent inward, parted by hardly less than its length from the border, and by nearly twice its length from the præbrachial transverse; alulæ white. Length of the body  $2\frac{1}{2}$  lines; of the wings 4 lines.

Subfam. HELOMYZIDES, *Fallén.*

Gen. HELOMYZA, *Fallén.*

38. HELOMYZA INTERVENTA, n. s. *Fæm.* Testacea, crassa, capite, scutelli apice, abdomine femoribusque nigris, alis cinereis antice subluridis.

*Female.* Testaceous, thick; head black, bristly above, white in front; antennæ testaceous, 3rd joint short; arista plumose; scutellum black towards the tip; abdomen black, elliptical, not longer than the thorax; femora black; wings cinereous, with a lurid tinge in front;

veins black, testaceous at the base; discal transverse vein straight, parted by a little more than half its length from the border, and by full twice its length from the præbrachial transverse. Length of the body 3 lines; of the wings 5 lines.

Gen. DRYOMYZA.

39. *Dryomyza semicyanea*, *Walk.* See Vol. III. p. 109.

Gen. SCIOMYZA, *Fallén.*

40. *Sciomyza? leucomelana*, *Walk.* See Vol. IV. p. 144.

Subfam. LAUXANIDES, *Walk.*

Gen. LONCHÆA, *Fallén.*

41. *Lonchæa? consentanea*, *Walk.* See Vol. IV. p. 146.

Subfam. ORTALIDES, *Haliday.*

Gen. LAMPROGASTER, *Macq.*

42. LAMPROGASTER SUPERNA, n. s. *Fæm.* Testacea, capite supra nigro, oculis albo-marginatis, thoracis disco cyaneo, abdomine supra purpureo, alis cinereis basi et apud costam fulvis, striga transversa guttaque antica exteriore nigris, striga costali apicali nigricante.

*Female.* Testaceous, shining; head black above, white about the eyes; mouth large; antennæ short, 3rd joint not more than half the length of the face; arista bare, pubescent at the base; scutellum and disk of the scutum blue; abdomen oval, purple above, a little shorter and broader than the thorax; wings cinereous, tawny at the base and along the costa, a black streak extending from the costa along the præbrachial transverse to the præbrachial vein; a black exterior dot on the radial vein, and a blackish streak at the tip of the costa; veins black, testaceous towards the base; discal transverse vein straight, oblique, parted by hardly one-third of its length from the border, and by about its length from the præbrachial transverse. Length of the body 5 lines; of the wings 10 lines.

Gen. PLATYSTOMA, *Latr.*

43. PLATYSTOMA POTENS, n. s. *Mas et Fæm.* Cinerea, crassa, capite ochraceo, thorace vittis septem nigris, abdomine subtus testaceo, pedibus rufescentibus, tarsis nigris basi testaceis, tibiis anticis apice nigris, alis cinereis nigricante confertissime guttatis, halteribus testaceis.

*Male and Female.* Cinereous, broad, thick; head ochraceous, white about the eyes and behind; face with a slender piceous stripe; antennæ ochraceous; 3rd joint long, linear, about half the length of the

face; arista whitish, bare, ochraceous at the base; thorax with seven slender blackish stripes; scutellum large, prominent; abdomen conical, testaceous beneath, much shorter than the thorax; oviduct long, black, slender, stylate; legs dull reddish; tarsi black, testaceous at the base; fore tibiae with black tips; wings cinereous, with very numerous various-shaped blackish spots and dots which form irregular bands; veins black, tawny along the costa, where there is a short lurid streak in the middle; discal transverse vein straight, parted by less than half its length from the border, and by much more than its length from the very oblique præbrachial transverse vein; halteres testaceous. Length of the body 6 lines; of the wings 12 lines.

This species is closely allied to *P. producta*, but the subapical cinereous band contains two dots.

44. *PLATYSTOMA PECTORALIS*, n. s. *Mas.* Cinerea, capite ochraceo, facie nigro biguttata, thorace vittis quinque nigricantibus, pectore vittis sex luteis, femoribus apice luteis, tibiis luteis apice nigris, tarsis basi pallide flavis, alis cinereis nigricante confertissime guttatis, halteribus pallide flavis.

*Male.* Cinereous; head ochraceous, white along the eyes; a black dot on each side of the face; antennæ about half the length of the face; arista black; thorax with five blackish stripes; pectus with three luteous stripes on each side; abdomen conical, shorter than the thorax; femora with luteous tips; tibiae luteous, with black tips; tarsi pale yellow at the base; wings cinereous, with very numerous various-sized, partly confluent, blackish dots; veins black; discal transverse vein curved outward, parted by much less than half its length from the border, and by more than its length from the oblique præbrachial transverse vein; halteres pale yellow. Length of the body  $4\frac{1}{2}$  lines; of the wings 9 lines.

#### Gen. *DACUS*, *Fabr.*

45. *DACUS STRIGIFER*, n. s. Cyaneo-niger, facie rufescente strigata, oculis argenteo marginatis, palpis apice rufescentibus, antennis longis basi rufescentibus, arista alba pubescente, thorace vittis tribus cinereis, tarsis posterioribus femoribusque albis apice nigris, alis cinereis, costa striga basali fasciaque lata exteriore nigris.

Bluish black; head silvery, hoary behind and about the eyes; face triangular, with a reddish streak which is abbreviated towards the peristoma; palpi with reddish tips; antennæ black, reddish towards the base; 3rd joint slender, very long, extending to the peristoma; arista white, pubescent, bare towards the tip, much longer than the 3rd joint; thorax with three cinereous stripes, which are united hindward; pectus cinereous; abdomen wanting; legs black; femora white, black towards the tips; fore coxæ white; posterior tarsi white, with black tips; wings limpid, black along the costa; a black discal

streak extending from the base to one-third of the length; a black broad irregular oblique band beyond the middle; veins black; discal transverse vein straight, parted by less than half its length from the border, and by about its length from the very oblique præbrachial transverse vein, which equals it in length; halteres white. Length of the body 6 lines; of the wings 10 lines.

46. *DACUS FURCIFER*, n. s. *Mas.* Anthracina, cinereo-tomentosa, antennis vix longis, arista plumosa, thorace vittis tribus nigris, pedibus longiusculis, alis cinereis nigro bifasciatis, fascia 2<sup>a</sup> latissima, linea costali exteriore apicem versus furcata, halteribus albis.

*Male.* Coal-black, with cinereous tomentum; third joint of the antennæ slightly tapering from the base to the tip, much shorter than the face; arista plumose; thorax with three blackish stripes; abdomen linear, narrower and very much longer than the thorax; legs rather long; wings cinereous; apical part of the costa with a black line, which emits a fork towards the tip; a narrow black oblique band before the middle, and beyond the middle a very broad black band, which is oblique in the contrary direction; veins black; discal transverse vein very slightly curved outward, parted by about one-fourth of its length from the border, and by less than its length from the straight, upright præbrachial vein, which is not more than half its length; halteres white. Length of the body 5 lines; of the wings 10 lines.

47. *DACUS EXPERTUS*, n. s. *Fæm.* Cyaneus, palpis, antennis pedibusque nigris, thorace vittis tribus cinereis, pedibus breviusculis, alis cinereis, costa exteriore apicibusque nigris, venis transversis nigro marginatis, halteribus testaceis.

*Female.* Dark blue; palpi, antennæ, and legs black; 3rd joint of the antennæ linear, slender, extending to the peristoma; thorax with three cinereous stripes; pectus cinereous; abdomen elongate-conical, a little longer and narrower than the thorax; legs short, stout; wings cinereous, black along the exterior part of the costa and about the tips; transverse veins clouded with black; discal transverse vein almost straight, parted by about half its length from the border and by about its length from the præbrachial transverse vein, which is oblique; halteres testaceous. Length of the body 4 lines; of the wings 8 lines.

48. *DACUS PERPLEXUS*, n. s. *Fæm.* Nigèr, capite luteo, facie nigro biguttata, antennis luteis longis, arista nigra nuda, thorace vittis tribus luteis, pectore maculis duabus trigonis luteis, abdomine fulvo lato striga brevi nigricante, pedibus luteis, alis limpidis, striga basali, vitta costali dentata vitta postica angulata fuscis.

*Female.* Black; head pale luteous, with a piceous dot on the front, and with a round black dot on each side of the face; 3rd joint of the antennæ extending to the peristoma, very slightly tapering from the base to the tip; arista black, bare; thorax with a luteous stripe, with

two luteous humeral calli, and with two hindward lateral luteous streaks; pectus with a large luteous triangular spot on each side; abdomen tawny, elliptical, with a slight blackish stripe, which is much abbreviated in front, longer and much broader than the thorax; oviduct long, slender, lanceolate; legs luteous; wings limpid, with a brown costal stripe which emits an angle in the middle, the angle parallel to an angular brown stripe on the hind border; an oblique brown streak proceeding from the base, and a brownish dot near the tip hindward; veins black, tawny towards the base; discal transverse vein undulating, parted by a little more than one-fourth of its length from the border, and by a little more than its length from the straight, upright præbrachial transverse vein; halteres pale yellow. Length of the body 6 lines; of the wings 12 lines.

Gen. SOPHIRA, *Walk.*

49. SOPHIRA PUNCTIFERA, n. s. *Fæm.* Testacea, antennarum articulo 3<sup>o</sup> brevi oblique truncato, arista nuda, thoracis abdominisque lateribus nigro punctatis, pedibus breviusculis, alis nigricantibus latiusculis albedo conferte punctatis.

*Female.* Testaceous; antennæ not nearly reaching the epistoma; 3rd joint short, obliquely truncated at the tip; arista bare; thorax, pectus, and abdomen with black points along each side; abdomen conical, not longer than the thorax; oviduct short, lanceolate; legs rather short and slender; wings blackish, rather broad, adorned with numerous transverse whitish points; discal transverse vein nearly straight, parted by one-fourth of its length from the border, and by about its length from the straight, upright præbrachial transverse vein. Length of the body 3 lines; of the wings 6 lines.

Gen. ORTALIS, *Fallén.*

50. ORTALIS PUNCTIFASCIA, n. s. *Fæm.* Cyanea, capite nigro, oculis albo marginatis, antennis rufis, arista plumosa, pedibus nigris, tarsis albis, alis albis nigro quadrifasciatis, fascia 3<sup>a</sup> punctum album includente, 4<sup>a</sup> strigam costalem emittente.

*Female.* Dark blue, shining; head black, white about the eyes; antennæ dark red, very short; 3rd joint conical, not much longer than the 2nd; arista plumose; abdomen very little longer than the thorax; oviduct black, furrowed; legs black; tarsi white, with black tips; wings white, with four black bands; 1st band basal; 3rd much broader than the others, including a white costal point; 4th emitting a black costal streak to the tip of the wing; præbrachial vein forming an angle at its junction with the discal transverse vein; the latter straight, parted by half its length from the border, and by much more than its length from the præbrachial transverse vein; halteres black. Length of the body  $2\frac{1}{2}$  lines; of the wings  $4\frac{1}{2}$  lines.

51. ORTALIS ÆQUIFERA, n. s. *Mas et Fæm.* Cyanescenti-nigra,

capite antico rufo, oculis albo marginatis, antennis rufis, arista nuda, thorace vitta lata cinerea, abdomine basi fulvo, coxis femoribusque anticis fulvis, alis cinereis vitta fasciisque duabus exterioribus nigris.

*Male and Female.* Bluish black; head black, red in front, white about the eyes; antennæ red, not reaching the epistoma; 3rd joint rather long, slightly tapering to the tip; arista bare; thorax with a broad cinereous stripe; pectus cinereous; abdomen linear, black, tawny towards the base, broadest in the female and with a prominent oviduct; legs black; fore coxæ and fore femora tawny; wings cinereous, with a black stripe extending from the base along the costa and thence descending to the middle of the disk; two exterior black bands, which are united on the costa, the second apical; discal transverse vein straight, parted by one-third of its length from the border, and by more than its length from the præbrachial transverse. Length of the body  $2\frac{1}{2}$  lines; of the wings  $4\frac{1}{2}$  lines.

52. *ORTALIS CONCISIVITTA*, n. s. *Mas.* Rufa, oculis albo marginatis, scutello, metathorace, pectoris disco abdominisque apice cyaneis, alis nigris, margine postico fascia apicibusque cinereis.

*Male.* Red, shining; head white about the eyes; antennæ nearly reaching the epistoma; 3rd joint long, linear; arista simple; scutellum, metathorax, disk of the pectus and abdomen towards the tip blue; abdomen conical, not longer than the thorax; wings blackish, cinereous along the hind border and towards the tips, which are blackish; a cinereous band between the transverse veins; veins black; discal transverse vein straight, upright, parted by less than one-fourth of its length from the border, and by hardly more than its length from the præbrachial transverse. Length of the body  $2\frac{1}{4}$  lines; of the wings  $4\frac{1}{2}$  lines.

### Gen. *TRYPETA*, *Meigen*.

53. *TRYPETA RETORTA*, n. s. *Fæm.* Picea, subtus testacea, capite, scutello abdominisque basi testaceis, pectoris disco piceo, femoribus anticis tibiis tarsisque testaceis, alis limpidis nigricante angulatim bivittatis.

*Female.* Piceous setose, testaceous beneath; head and antennæ testaceous, the latter not reaching the epistoma, 3rd joint linear; arista plumose; scutellum testaceous; disk of the pectus piceous; abdomen ovate, testaceous towards the base, a little longer than the thorax; terebra flat, conical; tibiæ, tarsi and fore femora testaceous; wings limpid, with a blackish costal stripe, which is broadest at the base and concave towards the tip, and is nearly parallel to another blackish stripe; the latter is also broadest at the base, and forms a right angle opposite the concavity of the fore stripe; discal transverse vein oblique, nearly straight, parted by one-third of its length from the border, and by a little less than its length from the præbrachial transverse. Length of the body 4 lines; of the wings 8 lines.

Subfam. SEPSIDES, *Walk.*Gen. CALOBATA, *Fabr.*

54. *Calobata impingens*, *Walk.* See Vol. IV. p. 161.

55. *CALOBATA GUTTICOLLIS*, n. s. *Fam.* Nigra, capite guttis duabus nigris, thorace antico guttis duabus lateralibus nigris, femoribus anticis apice tibiisque anticis nigris, tarsis anticis albis, femoribus posterioribus picco fasciatis, alis fusciscentibus cinereo trimaculatis.

*Female.* Testaceous; vertex with a black dot; disk of the front black; thorax with a black dot on each side in front; fore femora towards the tips and fore tibiæ black; fore tarsi white; posterior femora with a piceous band near the tips, which are also piceous; wings brownish, with three rather indistinct pale cinereous dots, of which the two exterior form an interrupted band; veins with the usual structure. Length of the body 5-5½ lines; of the wings 8-9 lines.

56. *CALOBATA DIFFUNDENS*, n. s. *Fam.* Subcinereo-nigra, capite chalybeo, oculis albo-marginatis, palpis antennisque apice rufescentibus, pedibus luteis, femoribus anticis dimidio apicali tibiisque anticis nigris, tarsis anticis albis basi nigris, femoribus posterioribus subdilatatis nigro trifasciatis, tibiis tarsisque posticis nigris, alis cinereis nigricante bifasciatis.

*Female.* Black; head chalybeous, white about the eyes; mouth and palpi reddish; thorax and abdomen with slight cinereous tomentum; abdomen lanceolate, nearly twice the length of the thorax, with a reddish tip; legs luteous; fore femora for half the length from the tips and fore tibiæ black; fore tarsi white, black at the base; posterior femora slightly dilated, with three black bands; hind tibiæ and hind tarsi black; wings cinereous, with two blackish bands, the 2nd apical; veins black, with the usual structure; halteres white. Length of the body 5 lines; of the wings 8 lines.

Subfam. PSILIDES, *Walk.*Gen. ANGITULA, *Walk.*

57. *Angitula longicollis*, *Walk.* See Vol. III. p. 123.

Gen. NERIUS, *Wied.*

58. *Nerius duplicatus*, *Wied.* See Vol. III. p. 125.

Fam. HIPPOBOSCIDÆ, *Leach.*Gen. ORNITHOMYIA, *Leach.*

59. *Ornithomyia Batchianica*, *Walk.* See Vol. V. p. 300.

## TERNATE.

Fam. STRATIOMIDÆ, *Haliday.*Gen. PTILOCERA, *Wied.*

1. *Ptilocera 4-dentata*, *Fabr.* See Vol. I. p. 7.

Fam. ASILIDÆ, *Leach*.Subfam. LAPHRITES, *Walk*.Gen. LAPHRIA, *Fabr*.

2. *Laphria socia*, *Walk*. See Vol. III. p. 84.

Subfam. ASILITES, *Walk*.Gen. ASILUS, *Linn*.

3. *Asilus condecorus*, *Walk*. See p. 7.

*Male*? Abdomen with a brownish tinge; sexualia very large.

4. *ASILUS NORMALIS*, n. s. *Mas et Fæm*. Cinereo-niger, capite subaurato, mystace e setis albis nigrisque, thorace vittis tribus anticis cinereis, abdomine fasciis fulvis, femoribus apices versus tibiisque rufescentibus, his nigro strigatis, alis nigris basi cinereis, halteribus sordide testaceis. *Fæm*. Abdomine stylato.

*Male and Female*. Cinereous black; head slightly gilded, with hoary hairs beneath; mystax with many white bristles and with a few higher black bristles; pectus and three stripes on the fore part of the thorax cinereous; abdomen with bands of tawny hairs and tomentum; legs stout; femora towards the tips and tibiæ reddish, the latter streaked with black; wings black, cinereous towards the base, the cinereous part extending in the disk beyond the middle; veins black, reddish at the base; lower branch of the cubital vein undulating; halteres dingy testaceous. *Male*. Abdomen lanceolate; sexualia small, elongate. *Female*. Abdomen elongate-conical, with narrower bands than those of the male; the four apical segments forming a black, shining, slender style. Length of the body 7-8 lines; of the wings 12 lines.

Gen. OMMATIUS, *Illiger*.

5. *Ommatius retrahens*, *Walk*. See Vol. IV. p. 88.

Gen. LEPTOGASTER, *Meigen*.

6. *LEPTOGASTER EXACTA*, n. s. *Mas*. Picea, capite pectoreque canis, antennis nigris basi luteis, thorace obscure rufo vittis tribus nigricantibus, pedibus pallide luteis, femoribus nigro bifasciatis, tibiis posticis apice tarsisque nigris, alis subcinereis apice nigro marginatis, halteribus pallide flavescentibus.

*Male*. Piceous; head hoary behind and beneath; antennæ black, luteous at the base; thorax dark red, with three blackish stripes; sides and pectus hoary; abdomen very slender; legs pale luteous; femora with two black bands, which are most distinct on the hind pair; tarsi and hind tibiæ towards the tips and knees black; wings slightly cinereous, black-bordered at the tips; veins black; halteres pale yellowish. Length of the body 6 lines; of the wings 10 lines.



Fam. SYRPHIDÆ, *Leach*.Gen. SYRPHUS, *Fabr.*

7. *Syrphus ericetorum*, *Fabr.* See Vol. III. p. 97.

Fam. MUSCIDÆ, *Latr.*Subfam. TACHINIDES, *Walk.*Gen. EURYGASTER, *Macq.*

8. *Eurygaster remittens*, *Walk.* See Vol. IV. p. 125.

Subfam. DEXIDES, *Walk.*Gen. DEXIA, *Meigen.*

9. *DEXIA PARALLELA*, n. s. *Mas.* Nigra, angusta, cylindrica, palpis antennisque rufis, his apice piceis, arista plumosa, thorace vittis tribus albidis, abdomine chalybeo-nigro fasciis albidis atrisque, pedibus longis, alis vitreis vitta costali nigra.

*Male.* Black, long, slender, cylindrical; head white, with a black band on each side between the eye and the epistoma; front prominent; frontalia broad, deep black; face slightly oblique; antennæ and palpi red; the former piceous towards the tips, nearly reaching the epistoma; 3rd joint linear, slender, rounded at the tip, about four times the length of the 2nd; arista plumose; thorax with three whitish stripes, the lateral pair broad, interrupted; pectus and postscutellum whitish, the former with two black bands on each side; abdomen chalybeous black, full twice the length of the thorax; segments with whitish fore borders and deep-black hind borders; legs long, slender; wings vitreous, with a black costal stripe, which is interlined with cinereous; veins pale except along the costa; præbrachial vein forming a slightly obtuse angle at its flexure, slightly curved inward from thence to its tip; discal transverse vein slightly undulating, parted by half its length from the border, and by a little less than its length from the flexure of the præbrachial; alulæ large, white. Length of the body 6 lines; of the wings 10 lines.

Gen. RUTILIA, *Desv.*

10. *Rutilia atribasis*, *Walk.* See Vol. V. p. 288.

11. *RUTILIA EXCELSA*, n. s. *Mas.* Cyaneo-viridis, capite albo strigis duabus lateralibus anticis nigris, frontalibus atris, abdomine cupreo, basi vitta et segmentorum marginibus posticis nigris, pedibus nigris, alis fusciscenti-cinereis basi fusco notatis.

*Male.* Bluish green; head white, with a black streak on each side, extending from the borders of the eyes to the epistoma; frontalia deep black, very narrow on the vertex, widening much in front; thorax

tinged here and there with cupreous; abdomen cupreous, with the 1st segment and a slender stripe deep black; the following segments, which are black along their hind borders, bluish green; legs black; wings brownish cinereous, tinged with brown near the base; præ-brachial vein forming a rounded right angle at its flexure, very slightly curved inward from thence to its tip; discal transverse vein slightly undulating, parted by less than one-third of its length from the border, and by very much more than its length from the flexure of the præ-brachial. Length of the body  $7\frac{1}{2}$  lines; of the wings 17 lines.

Subfam. MUSCIDES, *Walk.*

Gen. MUSCA, *Linn.*

12. *Musca promittens*, *Walk.* See Vol. IV. p. 134.

Subfam. ORTALIDES, *Haliday.*

Gen. PLATYSTOMA, *Latr.*

13. *Platystoma potens*, *Walk.* See p. 12.

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## C E R A M.

Fam. STRATIOMIDÆ, *Haliday.*

Gen. PTILOCERA, *Wied.*

1. *Ptilocera 4-dentata*, *Fabr.* See Vol. I. p. 7.

Gen. CLITELLARIA, *Meigen.*

2. *Clitellaria obesa*, *Walk.* See Vol. V. p. 232.

Fam. TABANIDÆ, *Leach.*

Gen. TABANUS, *Latr.*

3. *TABANUS SERUS*, n. s. *Fœm.* Cinereus, capite subtus pectoreque albis, antennis fulvis apice nigris, thorace vittis duabus ferrugineis, callis humeralibus testaceis, abdomine pedibusque fulvis, alis cinereis apud costam fuscis.

*Female.* Black, with cinereous tomentum; head beneath and pectus white; callus black, very slender, broader in front; palpi cinereous; antennæ tawny with cinereous tomentum towards the base, 3rd joint slightly curved, black towards the tip, with a very small horn; thorax with two ferruginous tomentose stripes; humeral calli testaceous; abdomen tawny, elongate-conical; legs tawny; tarsi black; wings cinereous, brown along the costa; veins black, with the usual structure, tawny at the base; halteres pale. Length of the body 6 lines; of the wings 12 lines.

Fam. ASILIDÆ, *Leach.*Subfam. LAPHRITES, *Walk.*Gen. LAPHRIA, *Fabr.*

4. *Laphria tristis*, *Dol.* See Vol. V. p. 146.
5. *Laphria Vulcanus*, *Wied.* See Vol. I. p. 10.
6. *LAPHRIA OSTENSA*, n. s. *Mas.* Nigra, aureo-pilosa, capite aurato, mystace nigro, thorace strigis quatuor lateralibus obliquis cinereis, abdomine subaurato segmentorum marginibus subauratis apice nigro alis limpidis dimidio apicali nigro.

*Male.* Black, wholly clothed with gilded hairs; head brightly gilded in front; mystax composed of some black bristles; third joint of the antennæ elongate-fusiform; thorax with two cinereous oblique streaks on each side; abdomen with cinereous tomentum; sides and hind borders of the segments slightly gilded; tip black, shining; legs thickly clothed with long gilded hairs; wings limpid; apical half black; halteres pale yellowish. Length of the body 8 lines; of the wings 14 lines.

Subfam. ASILITES, *Walk.*Gen. OMMATIUS, *Illiger.*

7. *OMMATIUS INEXTRICATUS*, n. s. *Mas.* Subaurato-cinereus, capite aurato, mystace e pilis aureis, antennis nigris basi fulvis, thorace lineis cinereis, segmentorum abdominalium marginibus posticis flavescenti-auratis, sexualibus rufis, pedibus nigris robustis, tibiis fulvis, alis lurido-cinereis.

*Male.* Black, with cinereous slightly gilded tomentum; head gilded, with white hairs beneath; mystax with gilded bristles; antennæ black, tawny towards the base, 3rd joint elongate-conical; thorax with slender cinereous stripes; abdomen with a yellowish gilded band on the hind border of each segment; sexualia deep red, shining; legs very stout; tibiæ tawny; wings lurid-cinereous, darker cinereous hindward and towards the tips; veins red; halteres dull reddish. Length of the body 9 lines; of the wings 16 lines.

Gen. LEPTOGASTER, *Meigen.*

8. *LEPTOGASTER MAGNICOLLIS*, n. s. *Mas.* Fulva, capite nigro antice argenteo, mystace albo, antennis fulvis basi apiceque nigris, thorace maculis duabus nigricantibus, abdomine tenui clavato apicem versus nigro, alis sublimpidis costa apiceque cinereis.

*Male.* Bright tawny; head black above, silvery white in front; mystax with white bristles; antennæ tawny, black towards the base and at the tips; thorax with a blackish spot on each side in front; pectus with pale gilded tomentum; abdomen slender, clavate, full thrice the length of the thorax, black towards the tip; tarsi much darker than

the tibiæ; wings nearly limpid, cinereous along the costa and towards the tips; veins black, tawny towards the base; halteres with piceous knobs. Length of the body 8 lines; of the wings 12 lines.

Fam. SYRPHIDÆ, *Leach.*

Gen. ERISTALIS, *Latr.*

9. *Eristalis splendens*, *Leg.* See Vol. III. p. 95.

Fam. MUSCIDÆ, *Latr.*

Subfam. SARCOPHAGIDES, *Walk.*

Gen. SARCOPHAGA, *Meigen.*

10. *Sarcophaga sericeo-nitens*, *Dol.* See Vol. V. p. 158.

Subfam. MUSCIDES, *Walk.*

Gen. MUSCA, *Linn.*

11. *Musca costalis*, *Dol.* See Vol. V. p. 159.

Subfam. ORTALIDES, *Haliday.*

Gen. OXYCEPHALA, *Macq.*

12. *OXYCEPHALA ALIENATA*, n. s. *Mas.* Rufescenti-fulva, capite nigro biguttato, metathorace pectoreque nigris, abdomine fusiformi basi supra nigro, femoribus basi nigro notatis, alis fuscis dimidio postico cinereo.

*Male.* Reddish tawny; head with a black dot in front of the base of the antennæ; face with two grooves; antennæ almost reaching the epistoma; 2nd joint clavate; 3rd linear, rounded at the tip, broader but not longer than the 2nd; metathorax and pectus black; abdomen fusiform, longer than the thorax, black above towards the base; legs robust; femora marked with black at the base; wings brown, hinder half cinereous; veins tawny, discal transverse vein slightly undulating, parted by hardly half its length from the border and by much more than its length from the præbrachial transverse. Length of the body 7 lines; of the wings 16 lines.

Gen. DACUS, *Fabr.*

13. *DACUS ABSOLUTUS*, n. s. *Fæm.* Cinereus, capite fulvo, facie nigro biguttata, antennæ longis arista nuda, thoracis lateribus scutelloque fulvis, abdomine fasciis interruptis nigris, apice plano stylato-lanceolato, alis cinereis costa fusciscente.

*Female.* Black, with hoary tomentum; head tawny; face oblique, with a black dot in the groove on each side; antennæ quite reaching the epistoma; 3rd joint very long, conical at the tip; arista bare; sides of the thorax, humeral calli and scutellum tawny; abdomen tawny, oval, with the exception of the four apical segments, which are shining and form a flat lanceolate style; basal part with four interrupted black

bands; legs testaceous; wings cinereous; with a brownish tinge along the costa; discal transverse vein straight, parted by one fourth of its length from the border and by about its length from the oblique præbrachial transverse vein; halteres testaceous. Length of the body 6 lines; of the wings 9 lines.

Gen. SOPHIRA, *Walk.*

14. SOPHIRA BIPARS, n. s. *Fam.* Fulva, nitens, abdomine nigro basi fulvo, alis nigris margine postico cinereo limpido-interlineato.

*Female.* Tawny, shining, with a few black bristles; head and pectus paler; 3rd joint of the antennæ linear, rounded at the tip, not reaching the epistoma; arista simple; abdomen oval, black except towards the base, shorter than the thorax; wings black, with a cinereous partly limpid stripe on the hind border; this stripe is interrupted by a black streak which extends along the discal transverse line; a pale point on the middle of the costa; discal transverse vein straight, parted by half its length from the border, and by about its length from the præbrachial transverse, which is rather long. Length of the body  $2\frac{1}{2}$  lines; of the wings 7 lines.

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On the Possibility of taking a Zoological Census.

By ALFRED NEWTON, M.A., F.L.S.

[Read March 21, 1861.]

It is now nearly five years since my friend, the late Mr. John Wolley, to whose genius as a naturalist I am proud to own my many great obligations, suggested to me in a letter the possibility of taking a census of the birds of these islands. The period of numbering the human population of the British Empire, which is now so close at hand, makes me think the present time, when men's minds are turned to the subject, not inopportune to bring to the notice of this Society the advantages which might possibly accrue to Zoology by taking an approximate census, not only of our birds, but also of the other divisions of our fauna. I believe that naturalists will bear me out in the assertion that hitherto nothing of this kind has ever been attempted in any branch of the science, and also that (with perhaps very few, but highly laudable, exceptions) no writer has ventured to express in any convenient form the relative proportion which the number of individuals of one species bears to those of another. In almost all local faunas the abundance or scarcity of different species is expressed in very arbitrary, not to say vague, terms. We find nothing more definite than the words "common," "frequently met with," "rare" or "occasionally seen" appended to the names of animals in some

even of the most carefully drawn-up lists. And yet, setting aside the immense difference there may exist between personal powers and opportunities of observation, to what two men will these phrases convey exactly the same meaning? Now I confess I know not in what way such records can be reduced, so to speak, to a common standard, save by expressing them in figures; nor how they can become generally useful unless they are understood in one and the same sense. It is far from my wish to depreciate such observations, and I say this to guard against misapprehension. Nay, I say more, if they are not taken for more than they are worth, they are highly useful; but *only as a basis for future and more complete inquiries*. In their present state, as it seems to me, there is no denying that they are imperfect. To take, for instance, an example from that branch of Zoology of which I am least ignorant. A Devonshire and a Durham ornithologist in a local list of birds would probably each return *Phyllopneuste trochilus* and *P. rufa* as "common." But were they to change places, the previous experience of each would, in a very short time, convince them that whereas, in the southern county, the latter species may double the former in numbers, in the northern the proportion might be exactly reversed. Now there are not very many people who have the chance of personally comparing for any sufficient time the proportionate numbers of the summer warblers on the banks of the Tamar and of the Tees. Besides, too, there is perhaps the naturalist resident perforce in Derbyshire who would fain institute a comparison between his own observations and those taken in Devonshire and Durham. The case becomes still more hopeless when we turn to foreign countries, and, referring to the duchy of Darmstadt or the province of Dauphiny, attempt to ascertain the relative abundance therein of the species I have named.

Having thus briefly indicated the existing want of any such standard whereby local observations may be compared, I turn to the advantages which seem likely to follow the practical rendering of this suggestion. As chief among them (and the only one I will here adduce) I would place the light which might in consequence be thrown upon what we have lately heard so much of, the great question of the "struggle for life." It appears to me that before we can assign any cause for the predominance of any one species over another in any given district, the first thing to be ascertained is *the measure of that predominance*. This found, if the relative abundance of other species which influence its well-being—say, of insects or plants as affording it food and harbour,

or of predatory animals as checking its increase—we shall surely have acquired some valuable facts bearing upon its existence, and thus be enabled to judge with less chance of error respecting its preservation as a “favoured race.” I am well aware that, in urging these remarks, I am laying myself open to the charge of Utopianism—and justly so, were I for a moment to deceive myself or to attempt to deceive others with the hope that such observations as I am advocating could be satisfactorily made, *except in very few instances*. But with these very few instances I am prepared to be content, at all events as a first step; for, if I mistake not, they would speedily be found of service, and the desire to extend them would as speedily grow.

Now as to the method by which these suggestions may be put in practice. It is plain that here lies the chief difficulty, and I only approach it with great caution. It may be at first sight not unnaturally objected, that the difference between personal powers of observation, which I have before mentioned, and the existence of which no one can doubt, will be as insuperable when these observations are represented in numbers as when they are expressed in words. I trust, however, that the Society will give me credit for asserting, on the strength of a somewhat protracted trial, that this objection is unfounded. I do not desire at present to go into particulars. I will merely state that I have found that, with comparatively little trouble, a sufficiently accurate account of the appearance, not only of every species of bird, but, with respect to many species, of every individual bird may be kept; and I do not see any reason why the same principle should not be extended to other groups of the animal kingdom. Indeed, I think that zoologists have only to apply themselves to the task, each in his own district, to accomplish what is wanted. So far the matter is easy; and were it only required that the numbers seen should be polled, no particular obstacle presents itself. But the real hindrance I find in what I may perhaps be allowed to call the “disturbing forces,” which must be duly appreciated before the returns from different localities can be reduced to a common standard for comparison. Herein the zoologist must avail himself of the help of the geologist and the botanist; and therefore have I thought it expedient to introduce the subject of this paper to the Linnean Society, a body so fully competent to deal with the mixed questions which must arise from its consideration, and with which I freely acknowledge my utter inability to cope. But I may also add that it is my intention immediately to pursue the matter further as regards

the branch of natural history to which I am most addicted, and, through a channel whereby I can address myself especially to my brother ornithologists\*, to enter into details which I should not be warranted in inflicting upon this Society, from some of whose members, however, I trust to receive that support in investigating the generalities of the case which can alone secure to the project even the smallest degree of success.

On certain Appendages to the Feet of Insects subservient to Holding or Climbing. By TUFFEN WEST, F.L.S.

[Abstract of papers read March 21 and June 6, 1861.]

THE structures in the foot of the Fly having long occupied the author's attention, he was induced, by the fact of their minuteness and the difficulties attending satisfactory examination and reasoning thereon, to search amongst insects generally for examples of analogous structures on a larger scale. With this view many examinations were made of such insects as could be procured; and whenever practicable, they were viewed in action in the live-box. The importance of this was urged as the only way to obtain correct ideas regarding structures which must be more or less soft in order to fulfil their intended purposes, and which, therefore, are generally found shrivelled and distorted in dried specimens.

The labours of other observers in the same field were first mentioned, from which it appears that the way in which some insects are enabled to suspend themselves or to walk freely against gravity had been ascribed to causes which might conveniently be classified as follows:—

A. By the entire cushions (of flies) acting as suckers.

B. By the hairs with which the under surface of these cushions is furnished acting

a. as minute hooks;

b. as suckers;

c. by adhesion through the emission of a *viscid* secretion from supposed glands in their expanded terminations;

d. as suckers, adhesion being assisted by the emission of a small quantity of fluid from such supposed glands.

The author then gave the results of his own examinations, stating that similar structures to those on the feet of flies were present in many beetles, the largest being on the dilated anterior tarsi of the males amongst the Geodephagi or ground-beetles.

\* See 'The Ibis' for 1861, pp. 190-196.



Those presented by *Pterostichus* were then somewhat minutely described, as the largest the author had had the opportunity of observing whilst living and in action. They may be considered as composed of two portions: the first is an elastic membrane, perfectly smooth on the lower surface to admit of its exact adaptation; the second, on which the former is borne, is a long stem or pedicle arising at an oblique angle from the tarsal joint, and bent suddenly downwards near its insertion into the membranous portion, by which the latter is rendered capable of being brought into contact through its whole extent with the surfaces to which it is applied. In the beetle in question the membrane is reniform, with its long axis directed transversely. *Amara* was then noticed as possessing similar organs, with some of the *Carabi*; it appeared that, as a *general* rule, their number was increased as their size diminished. The presence of scale-like hairs on the back of these membranous expansions in some cases was mentioned as affording a clue to the condition in *Carabus*, where irregular elevated wrinkles simulate such corrugations as would be produced by the contraction of a membranous tube.

The structure of these expanded membranous organs was shown to agree in every respect with that of true hairs—as being hollow for some distance, seated in a depression of the integument on a slight papilla, and shut off from the cavity of the joint by a delicate membrane, to which some fibres (including probably a nerve) could be traced. These statements were borne out by examinations of the parts in *Carabus* and *Dytiscus*, whence the scarcely expected result was obtained that the “suckers” of the latter are themselves only hairs still more modified.

Various forms of these spathulate hairs, and plans of their arrangement on the tarsi, were mentioned, with the different insects on which the author had met with them.

The strong resemblance in the structure of the bilobed Dipterous pulvillus to the almost equally cleft third joint in *Curculio* and *Chrysomela*, which are both furnished with these spathulate appendages, led the author to throw out the suggestion that the former was, in a homological sense, a modified joint. The principal difficulty in accepting such a view (namely, the position of the claws) was combated by showing that the latter are themselves only modified hairs, usually converted into hooks to serve a special purpose\*. In

\* Since the above was written, the author has had the opportunity of examining the feet of the Ephemera in the living fly, and has ascertained the curious fact, that whilst one of the unguis remains in its normal condition as a strongly curved, horny hook, the other is converted into a soft fleshy sucker.

the hind legs of some aquatic insects, when they are not used either as aids to progression or for the capture of prey, the claw-hairs are scarcely distinguishable from other hairs by which they are surrounded. The five "supplementary claws" (slightly modified hairs) of *Epeïra*, and still more noticeably the claws found by the author along the entire under surface of the tarsi of *Pholcus phalangoides*, were mentioned as supporting this view.

This, the first portion of the paper, after recalling the brilliant researches of Professor Huxley on various dissimilar tegumentary structures formed from hairs in the higher animals, concluded with a few reflections on the equally remarkable series of modifications of the same essential part in the Articulata.

In the second portion of the paper the structure of sucking-disks of a more complicated nature was somewhat minutely treated.

The most complex in structure was stated to occur in the feet of the Wasp, Hornet, and some of the Bees, in which it is a single central organ, situated beneath the unguis. Its various parts were described, with their appearance whilst in action. It was stated that in some, as the Hymenoptera, the whole organ was soft and contractile, to enable it to be readily put away out of danger, as well as preserved in efficient condition for action when required. It was believed that the whole of the Lepidoptera were also furnished with a similar organ, but that, being of firmer consistency in them, it was less liable to injury; and the author had been unable to satisfy himself that, in any of this tribe, it possessed such an amount of contractility.

The bifid sucker of *Malachius æneus* in the Coleoptera, and of several of the Pentatomidæ amongst the Hemiptera, was then described, together with the hood-like sucker ("vesicle" of authors) terminating the tarsi in *Thrips*, in various species amongst the Cecropidæ, and in many of the Acarida. Several Tipulidæ were mentioned as presenting the only instances of a sucker beneath the claws amongst the Diptera.

The idea was broached that the terminal sucking-disk was perhaps an additional tarsal joint modified to serve a special purpose.

The paper was illustrated by numerous drawings and specimens; one of the latter, a beetle, possessed of as perfect powers of walking on glass as a fly, was shown living.

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Notice on the Habits of the "Agricultural Ant" of Texas  
["Stinging Ant" or "Mound-making Ant," *Myrmica (Atta)*  
*malefaciens*, Buckley]. By GIDEON LINCCEUM, Esq., M.D.  
Communicated by CHARLES DARWIN, Esq., F.R.S., F.L.S.

[Read April 18, 1861.]

THE following is merely an abstract of Dr. Lincceum's communication, containing only what appears to be most remarkable and novel in it in the way of observation.

"The species which I have named 'Agricultural,' is a large brownish Ant. It dwells in what may be termed paved cities, and, like a thrifty, diligent, provident farmer, makes suitable and timely arrangements for the changing seasons. It is, in short, endowed with skill, ingenuity, and untiring patience sufficient to enable it successfully to contend with the varying exigencies which it may have to encounter in the life-conflict.

"When it has selected a situation for its habitation, if on ordinary dry ground, it bores a hole, around which it raises the surface three and sometimes six inches, forming a low circular mound having a very gentle inclination from the centre to the outer border, which on an average is three or four feet from the entrance. But if the location is chosen on low, flat, wet land liable to inundation, though the ground may be perfectly dry at the time the ant sets to work, it nevertheless elevates the mound, in the form of a pretty sharp cone, to the height of fifteen to twenty inches or more, and makes the entrance near the summit. Around the mound in either case the ant clears the ground of all obstructions, levels and smooths the surface to the distance of three or four feet from the gate of the city, giving the space the appearance of a handsome pavement, as it really is. Within this paved area not a blade of any green thing is allowed to grow, except a single species of grain-bearing grass. Having planted this crop in a circle around, and two or three feet from, the centre of the mound, the insect tends and cultivates it with constant care, cutting away all other grasses and weeds that may spring up amongst it and all around outside of the farm-circle to the extent of one or two feet more. The cultivated grass grows luxuriantly, and produces a heavy crop of small, white, flinty seeds, which under the microscope very closely resemble ordinary rice. When ripe, it is carefully harvested, and carried by the workers, chaff and all, into the granary cells, where it is divested of the chaff and packed away.

The chaff is taken out and thrown beyond the limits of the paved area.

"During protracted wet weather, it sometimes happens that the provision stores become damp, and are liable to sprout and spoil. In this case, on the first fine day the ants bring out the damp and damaged grain, and expose it to the sun till it is dry, when they carry it back and pack away all the sound seeds, leaving those that had sprouted to waste.

"In a peach-orchard not far from my house is a considerable elevation, on which is an extensive bed of rock. In the sand-beds overlying portions of this rock are fine cities of the Agricultural Ants, evidently very ancient. My observations on their manners and customs have been limited to the last twelve years, during which time the enclosure surrounding the orchard has prevented the approach of cattle to the ant-farms. The cities which are outside of the enclosure as well as those protected in it are, at the proper season, invariably planted with the ant-rice. The crop may accordingly always be seen springing up within the circle about the 1st of November every year. Of late years however, since the number of farms and cattle has greatly increased, and the latter are eating off the grass much closer than formerly, thus preventing the ripening of the seeds, I notice that the 'Agricultural Ant' is placing its cities along the turn-rows in the fields, walks in gardens, inside about the gates, &c., where they can cultivate their farms without molestation from the cattle.

"There can be no doubt of the fact, that the particular species of grain-bearing grass mentioned above is intentionally planted. In farmer-like manner the ground upon which it stands is carefully divested of all other grasses and weeds during the time it is growing. When it is ripe the grain is taken care of, the dry stubble cut away and carried off, the paved area being left unencumbered until the ensuing autumn, when the same 'ant-rice' reappears within the same circle, and receives the same agricultural attention as was bestowed upon the previous crop,—and so on year after year, as I *know* to be the case, in all situations where the ants' settlements are protected from graminivorous animals."

In a second letter, Dr. Lincecum in reply to an inquiry from Mr. Darwin, whether he supposed that the ants plant seeds for the ensuing crop, says, "I have not the slightest doubt of it. And my conclusions have not been arrived at from hasty or careless observation, nor from seeing the ants do something that looked a little like it, and then guessing at the results. I have at

all seasons watched the same ant-cities during the last twelve years, and I know that what I stated in my former letter is true. I visited the same cities yesterday, and found the crop of ant-rice growing finely, and exhibiting also the signs of high cultivation, and not a blade of any other kind of grass or weed was to be seen within twelve inches of the circular row of ant-rice."

In his second letter Dr. Lincecum proceeds to give some account of what he terms the "Horticultural Ant," which appears to be identical with the "Cutting Ant," *Ecodoma mexicana*, Sm., described by Mr. S. B. Buckley in the 'Proceedings of the Academy of Natural Sciences of Philadelphia,' 1860, p. 233\*; but as his account does not contain any important additional observations, it is here omitted.

Mr. Buckley also describes (*l. c.* p. 445), the "Agricultural" or "Mount-making Ant," although his account of its habits will be found to differ in several respects from that given by Dr. Lincecum.

Descriptions of some New Species of Ants from the Holy Land, with a Synonymic List of others previously described. By FREDERICK SMITH, Esq., Assistant in the Zoological Department, British Museum. Communicated by DANL. HANBURY, Esq., F.L.S.

[Read April 4, 1861.]

THE ants which form the subject of the present paper were collected in Syria and Palestine by Dr. J. D. Hooker and Mr. Daniel Hanbury, during a visit of a few weeks to those countries in September and October last. The species, though only ten in number, are part of a fauna replete with interest: all the productions, in fact, of the Holy Land are so worthy of our attention, that he who adds even the smallest number of species to the list does not work in vain.

I am not prepared to say how many, or even if any, of the species of Ants forming the present list have been recorded as indigenous to Palestine; but in one or two cases the knowledge of the geographical distribution of ants is rendered highly interesting. Not only do we here find species common to Southern Europe, but in *Formica brunnea* and *Tapinoma erraticum* we recognize insects found even in the vicinity of our own metropolis. A few observa-

\* A notice of this paper will be found in the Annals & Mag. Nat. Hist. 3 ser. vi. p. 386.

tions on the habits of one or two species are added in the hope of contributing to the dissemination of a knowledge of the marvellous history of the economy of this most interesting family of insects.

Fam. FORMICIDÆ, *Leach*.

Gen. FORMICA, *Linn*.

FORMICA COMPRESSA. *F. nigra*, thorace compresso, antennis apice femoribusque rufis, capite maximo.

*Formica compressa*, *Fabr. Ent. Syst.* ii. 353. 2.; *Latr. Fourm.* p. 111.

This species is found in Egypt, in most parts of India, in China, and I have also seen examples from the Philippines. The *worker major* differs greatly in form from the *worker minor*; it is nearly seven lines in length, is black, with the base of the legs pale red, its head being larger and wider than the abdomen. The other form of the worker is smaller, the thorax and legs pale, the head oblong and narrower than the abdomen, the latter being frequently more or less pale at the base. Taken on the north shore of the Dead Sea.

FORMICA VIATICA. Sanguinea, opaca, antennis pedibusque rufo-brunneo; abdomine nigro-fusco.

*Formica viatica*, *Fabr. Ent. Syst.* ii. 356. 27; *Syst. Piez.* p. 404. 33. ♀.

—*Formica bicolor*, *Fabr. Ent. Syst.* ii. 351. 5; *Syst. Piez.* p. 398.

♂.—*Formica megalochola*, *Foerst. Verh. d. naturh. Ver. d. Rheinl.*

vii. 485. ♀.—*Cataglyphis Fairmairei*, *Foerst. Verh. d. naturh. Ver. d.*

*Rheinl.* vii. 485. ♂.—*Monocombus viaticus*, *Mayr, Form. Austr.*

p. 110. 1.

This ant and the *Atta cephalotes*, according to the information that I have been able to obtain, are usually, if not always, found in the same localities; and it would appear that, in some degree, they are dependent on each other. It is now a well-ascertained fact, that other species, in the fulfilment of their economy, require the aid of a distinct race, or rather are dependent on slave-labour for the rearing of their young brood, and for the performance of many other offices connected with the duties of their formicarium.

The connexion between the *F. viatica* and *Atta cephalotes* appears to be similar to that which exists between *F. sanguinea* and *F. fusca*. The substance of the following account was communicated by M. Roussel to Dr. Nylander. M. Roussel observes that both species are common in Algeria, that they live in numerous societies, and construct their formicaria usually in banks, frequently at road-sides. It would appear that fierce combats take place occasionally between the *Formicæ* and the *Attæ*, the former being always victorious, and carrying off captive numbers of the *Attæ*, which henceforth become the nurse-slaves of *F. viatica*. M. Roussel frequently observed evidences of fierce encounters between these species of ants, having found the ground in the vicinity of the nests of the *Attæ*

strewn with the mangled remains of both combatants; but he does not appear to have ascertained whether the *F. viatica* carries off the *Atta* in the pupa or perfect condition. Probably the former, since, judging from analogy, it would appear necessary that such should be the case, as under such circumstances the *F. fusca* in the nest of *F. sanguinea* appears to form, as it were, an absolutely necessary part of the community. Probably such perfect individuals as are sometimes carried off by slave-making ants, are not intended to form part of the living population. Mr. Bates, who resided several years in Brazil, communicated to me some very interesting accounts of the habits of various predaceous species of ants. Not only did he observe the slave-makers carrying off pupæ from the nests of more peaceable communities, but he also witnessed the slaughter of the defenceless species—their furious assailants tearing the larger and more weighty females limb from limb, and then carrying away the mangled remains to their own habitations. Such, probably, is the fate of such living examples as may be frequently observed vainly struggling with their more warlike invaders.

M. Roussel observed *Atta cephalotes* in great numbers, living in perfect harmony, in the nests of *F. viatica*.

FORMICA BRUNNEA. *F. fusco-nigra*, cinereo-micans; antennis pedibusque pallide testaceis; squama leviter emarginata.

Formica brunnea, Latr. *Fourm.* p. 169, pl. 6. fig. 35. ♀.—Formica timida, Foerst. *Hym. Stud. Form.* p. 35. 15.

A most widely distributed species, being found in England, France, Germany, Austria, Italy, Algeria, and also in Palestine. Specimens from North America have also been examined, which I am unable to separate from this species.

FORMICA "BIPARTITA. *F. operaria*. Rufo-ferruginea; metathorace spinis duabus acutis minutis; abdomine nigerrimo nitido.

*Worker.* Length 2 lines. The head, thorax, and legs rufo-ferruginous, smooth and slightly shining, the eyes black; the thorax much compressed behind; the metathorax obliquely truncate, concave above; the lateral margins acute, terminating posteriorly in an acute angle, or short spine; the scale of the peduncle oblong, notched above, inclining forwards, and fitting into the oblique slightly concave truncation of the metathorax: when viewed sideways, it is wedge-shaped; the abdomen ovate, and shining black.

I at first sight mistook this very distinct, and apparently undescribed ant, for a species belonging to the genus *Myrmica*, to many of which it bears a strong resemblance. In size, general form, and more particularly its spinose metathorax, it approaches the *Myrmicidæ*; but its having a single scale, or node, at once points out its situation to be amongst the *Formicidæ*. I much regret having only workers for examination; and although upwards of thirty were captured, not one possesses an antenna. Had all the sexes been before me, I have a strong impression that this

species would have been found to form a new genus, intermediate between *Formica* and *Myrmica*. Future observation and research will probably supply the materials for deciding this interesting question.

Gen. TAPINOMA, *Foerst.*

TAPINOMA ERRATICA. *T. nigro-fusca*, nitida, glabra; pedum articulis tarsisque pallidis; squama oblonga depressa.

*Formica erratica*, *Latr. Hist. Nat. Fourm.* p. 182.—*Tapinoma erratica*, *Smith, Brit. Fourm.* p. 111. 1.

The collection contained a single example of this species. Its coming from so distant a locality created a doubt of the possibility of its being identical with the species found in this country and throughout Europe; but after the most attentive examination having been given to it, I acknowledge my inability to detect the slightest difference between them.

Fam. MYRMICIDÆ.

Gen. MYRMICA, *Latr.*

MYRMICA JUCUNDA. *M. fusco-nigra*, nitida; mandibulis antennis pedibusque articulis et tarsis rufo-pallescentibus.

*Worker.* Length  $1\frac{1}{2}$  line. Brownish black, very smooth and shining; the mandibles, anterior portion of the head, the antennæ, tarsi, and articulation of the legs pale testaceous; the eyes small and placed midway at the sides of the head. Thorax narrowed posteriorly, with the division between the meso- and metathorax strongly impressed; the metathorax with two very minute spines; the first node of the abdomen, when viewed sideways, is wedge-shaped, the second globose. Abdomen subovate, widest towards the apex.

MYRMICA GRACILLIMA. *M. rufo-pallida*, lævis, nitida; abdomine nitido nigro.

*Worker.* Length  $1\frac{1}{2}$  line. Pale rufous, smooth and shining; the head oblong, rather wider than the abdomen; the mandibles stout and armed with four black acute teeth on their inner margin; the eyes small, ovate, and placed in the middle at the sides of the head; club of the antennæ 3-jointed; the antennæ as long as the head and thorax. Thorax compressed, the division between the meso- and metathorax strongly impressed; the metathorax unarmed. Abdomen ovate, black, smooth and shining; the nodes of the peduncle pale rufous, the first elevated above the second; when viewed sideways, wedgeshaped, with the apex blunt, the second globose.

There is a certain similarity in the habit of this small ant that induces me to think it quite possible that it may be only a very diminutive form of the worker of *Atta barbara*.

MYRMICA PUNICA. *M. rufo-pallida*; capite longitudinaliter delicatule striato; metathorace parvo, acuto, dentiformi.



*Worker.* Length nearly  $1\frac{1}{2}$  line. Pale red, the legs and antennæ palest; the flagellum of the latter with 3 joints in the club; the head wider than the abdomen, delicately striated longitudinally; the mandibles stout, striated, and furnished with 4 or 5 black teeth on their inner margin; the eyes small, black, and situated about midway at the sides of the head. Thorax, the anterior margin transverse; the division between the meso- and metathorax strongly impressed; the metathorax armed with two short acute spines. Abdomen smooth and shining; the nodes ovate and shining; the thorax and abdomen with a few erect pale hairs.

Gen. ATTA, *Fabr.*

ATTA BARBARA. (*Formica barbara*, *Linn. Syst. Nat.* i. 962. 2; *Fabr. Ent. Syst.* ii. 356. 26; *Syst. Piez.* p. 403. 30.—*Formica binodis*, *Fabr. Syst. Piez.* p. 405. 39; *Latr. Fourm.* p. 285.—*Formica juvenilis*, *Fabr. Syst. Piez.* p. 405. 38.—*Myrmica capitata*, *Losana, Form. Piem.* p. 325.—*Formica capitata*, *Latr. Fourm.* p. 234. pl. 10. fig. 66. ♀ c. ♀ A.—*Atta capitata*, *St. Farg. Hym.* i. 173. 1.)

This ant is one of the most widely distributed species; it is also one which varies greatly in colouring; hence has arisen the confusion which the above synonym exhibits. The *F. barbara* of Linnaeus is a form of the species which has the head and antennæ red; the *F. juvenilis* of Fabricius is a black variety. The *A. capitata* of Europe, according to Nylander and Mayr, varies from individuals totally black to others having the head and legs red, with the thorax more or less obscurely so. These observations apply to the worker only; the male is, I believe, always black; the female is sometimes, but rarely, as highly coloured as the worker. The numerous specimens from Palestine exhibit various shades of coloration; the majority being, however, more highly coloured than any which I have seen captured in Europe. The head, thorax, legs, and in some instances, the nodes of the petiole also are entirely bright red; of those taken in Jerusalem, some are highly coloured, whilst others are quite black. The species has not been discovered in England, but it is common in many parts of France, Germany, Austria, Hungary, Dalmatia, Italy, Sardinia and Sicily; I have also received it from Portugal. The nests of this ant are frequently much infested by a myrmecophilous beetle, *Pycnidium testaceum*.

ATTA STRUCTOR. (*Formica structor*, *Latr. Fourm.* p. 236.—*Formica lapidum*, *Fabr. Syst. Piez.* p. 406. 49 ♀.—*Formica rufitarsis*, *Fabr. Syst. Piez.* p. 406. 45. ♀.—*Atta structor*, *St. Farg. Hym.* i. 174. 2.—*Myrmica structor*, *Nyland. Form. Cr. et d'Algér.* 85. 10, Div. 2.)

This species has not been found in England, but is scattered over great part of Europe, having occurred in France, Italy, Germany, Austria, Dalmatia, and Switzerland; it has also been found in Algeria.

Catalogue of Hymenopterous Insects collected by Mr. A. R. Wallace in the Islands of Ceram, Celebes, Ternate, and Gilolo. By FREDERICK SMITH, Esq., Assistant in the Zoological Department, British Museum. Communicated by W. W. SAUNDERS, Esq., V.P.L.S., &c.

[Read June 6, 1861.]

OF the extensive and valuable additions which Mr. Wallace has made to our knowledge of the geographical distribution of the various genera of Aculeate Hymenoptera, none are perhaps more interesting than those contained in the present paper. Two fine new species of the parasitic genus *Thynnus*, from Gilolo, are especially interesting; this being the extreme limit of the known northern range of that genus from its metropolis, Australia. I would also particularly direct attention to a second species of the genus *Methoca* from Celebes. This genus, long represented by a single European species, was supposed to be confined to that quarter; but during the last few years it has been discovered in North America, two species being described by Say, and one by myself, from that country, one species from Cuba, another from India, and two by Mr. Wallace from the Island of Celebes.

Many fine additions to the Formicidæ, as well as to the fossorial division of the Aculeata, are contained in the present collections, which are the property of William Wilson Saunders, Esq.

### Fam. FORMICIDÆ, *Leach*.

#### Gen. FORMICA, *Linn*.

1. *Formica laetaria*, *Smith*, *Proc. Linn. Soc. Supp.* v. 95. 6.

*Hab.* Gilolo, Bachian.

2. *Formica quadriceps*, *Proc. Linn. Soc.* iv. 137. 9.

*Hab.* Ceram, Aru.

3. FORMICA CONSANGUINEA. *F.* capite abdomineque nigro-fuscis; antennis, thorace, abdomine, squamula pedibusque ferrugineis.

*Worker.* Length 3 lines. Head black, with a slight ferruginous tinge and a prismatic lustre in various lights; before the insertion of the antennæ it is red as well as the mandibles and antennæ; the latter slender and a little longer than the thorax. The thorax narrow, and much compressed behind; and, as well as the legs, of a bright pale ferruginous. Abdomen ovate, fuscous and thinly sprinkled with pale hairs; the scale of the peduncle ferruginous, small, narrow, upright, with the superior margin rounded.

*Hab.* Celebes (Tondano).

This is probably the worker minor of *F. virulens*.

4. *FORMICA CIRCUMSPECTA*. *F. rufo-picea*, antennis pedibusque pallide ferrugineis; squamula subquadrata, supra emarginata (*femina*). *F. pallide ferruginea*, elongata et gracilis; abdomine rufo-fusco (*operaria*).

*Female*. Length  $6\frac{1}{2}$  lines. Rufo-piceous, smooth and shining, the anterior part of the head, its anterior margin, the scutellum and base of the abdominal segments of a brighter colour; the antennæ, legs, and scale of the peduncle pale rufo-testaceous; the head oblong, narrowed anteriorly, transverse behind, and slightly emarginate in the middle; the mandibles stout, punctured, and with a row of black acute teeth on their inner margin; the head slightly punctured in front; the scale of the peduncle subquadrate, slightly emarginate above.

*Worker major*.  $3\frac{1}{2}$  lines. Of a pale ferruginous, with the posterior portion of the abdomen fuscous; head oblong, narrowed behind the eyes; thorax oblong, narrow, compressed behind; the scale of the peduncle small, narrow, with the superior margin rounded above; the thorax narrowed anteriorly, forming a sort of neck.

The *worker minor* is 2 lines in length, more slender than the larger worker, with the antennæ and legs much more elongate, the head narrowed behind, and the thorax prolonged into a sort of neck when viewed sideways.

*Hab.* Celebes (Tondano).

5. *FORMICA LEUCOPHÆA*. *F. nigra*, dense cinerea, pilosa; thorace postice attenuato; squama oblongo-ovata.

*Worker*. Length 3 lines. Black and densely covered with a fine silky cinereous pile; antennæ nearly as long as the body, slender, and filiform, the flagellum scarcely thickened towards the apex; eyes rather large and prominent, and situated high on the sides of the head; head oblong, narrowed behind the eyes. Thorax oblong, narrowed and of equal width behind the prothorax; legs very obscurely reddish, with the apical joints of the tarsi rufo-testaceous. Abdomen ovate, the apical margins of the segments testaceous; the scale of the peduncle narrow, small, and pointed above.

*Hab.* Celebes (Tondano).

6. *FORMICA TROPICA*. *F. nigerrima*, nitida, lævissima; thorace pubescente, postice compresso; pedibus rufo-nigris.

*Worker*. Length  $3\frac{1}{4}$  lines. Jet black, smooth, shining, and having a faint prismatic lustre, particularly on the head, which is oblong, or subquadrate; the tips of the mandibles ferruginous. The prothorax rounded at the sides and in front; a deep constriction at the base of the metathorax, which is elevated and rounded above; the thorax has a loose long pale scanty pubescence, probably much more dense in specimens in fine condition; the legs very obscurely ferruginous, nearly black; the legs, particularly the tibiæ, have a thin long loose

pale pubescence. Abdomen thinly sprinkled with pale hairs; the scale of the peduncle rounded and blunt above, not much elevated.

*Hab.* Gilolo.

7. *FORMICA VIRULENS*. *F. capite, thorace pedibusque rufo-ferrugineis; abdomine nigro; squama oblongo-ovata.*

*Worker.* Length 4 lines. Head, antennæ, thorax, and legs rufo-ferruginous; the head very large, much wider than the abdomen, emarginate behind, and rounding at the sides to the tips of the mandibles; the latter triangular, stout, and longitudinally striated, their inner margin dentate. The thorax compressed behind. Abdomen shining, black, with the margins of the segments ciliated with pale hairs; the scale of the petiole oblong-ovate.

*Hab.* Celebes (Tondano).

8. *FORMICA (TAPINOMA) GIBBA*. *F. castaneo-rufa; antennis, tibiis tarsisque fuscis; metathorace supra rotundato, postice truncato.*

*Worker.* Length  $1\frac{3}{4}$  line. Dull chestnut red; the head rounded behind the eyes, the latter ovate, and situated rather more inwards than is usual, the eyes are also rather large; the antennæ, tibiæ, and tarsi fuscous; the antennæ inserted rather wide apart, nearly in a line with the inner margins of the eyes. Thorax, sub-rugose above, narrowed posteriorly, and deeply constricted between the meso- and metathorax; the latter elevated, rounded above, and truncate behind, the truncation obliquely concave. Abdomen ovate, produced anteriorly over the node of the peduncle, which is oblique, and falls into the truncation of the metathorax.

*Hab.* Celebes (Tondano).

This species belongs to Foerster's genus *Tapinoma*.

9. *FORMICA (TAPINOMA) ALBIPES*. *F. nigra, subnitida, glabra; metathorace dorso abbreviato; squama oblongo-depressa; pedum articulis tarsisque albis.*

*Worker.* Length  $1\frac{1}{4}$  line. Black, slightly shining; the antennæ inserted widely apart on the front of the head; the metathorax oblique behind; the scale of the peduncle decumbent and hidden beneath the base of the abdomen, which projects forwards; the tarsi white.

*Hab.* Celebes (Tondano).

#### Gen. *POLYRHACHIS*, *Smith* \*.

1. *Polyrhachis hastatus*, *Latr. Hist. Nat. Fourm.* p. 129, pl. 4. fig. 23, ♀.

*Hab.* Celebes; India.

The specimen from Celebes has the metathoracic spines shorter than Indian specimens which I have seen, and those on the node of the peduncle are also rather shorter; however, in its opaque blackness and in every other particular the insect is identical.

\* A figure of the scale of the peduncle of each of the new species described will be found on Plate I., illustrative of this paper.

2. *Polyrhachis bihamatus*, *Drury, Ins. ii. pl. 38. f. 8, ♂*.  
*Hab.* Celebes; Bachian; Sumatra; Borneo; India; Ceram.
3. *Polyrhachis Merops*, *Smith, Proc. Linn. Soc. Supp. v. 98. 9*.  
*Hab.* Celebes; Bachian.
4. *Polyrhachis Busiris*, *Smith, Proc. Linn. Soc. Supp. v. 98. 7, ♀*.  
*Hab.* Celebes; Bachian.
5. *Polyrhachis bicolor*, *Smith, Cat. Hym. Ins. pl. 6 (Formicidæ), p. 65. 25*.  
*Hab.* Ternati; Burmah.
6. *Polyrhachis rugifrons*, *Smith, Proc. Linn. Soc. Supp. v. 70. 3*.  
*Hab.* Ceram; Makassar.
7. *Polyrhachis rufofemoratus*, *Smith, Proc. Linn. Soc. iii. 142. 14*.  
*Hab.* Ceram; Aru.
8. **POLYRHACHIS ORSYLLUS.** *P. niger*, cinereo-sericeo vestitus; thorace supra deplanato; spinis duabus acutis antice armato; squama integra; tibiis ferrugineis.  
*Worker.* Length 3 lines. Black and thinly clothed with silky cinereous pile; the extreme apex of the flagellum and the palpi pale rufo-testaceous. The head and thorax above longitudinally and delicately striated; the margins of the thorax acute and slightly raised; the spines on the prothorax short, stout, and acute; the tibiæ ferruginous, the posterior pair rather dusky. Abdomen globose, the node of the peduncle broad, with its superior margin rounded, not spined. (Pl. I. fig. 6.)  
*Hab.* Celebes (Tondano).
9. **POLYRHACHIS MUTILÆ.** *P. niger*; capite thoraceque cinereo-sericeo vestitis; abdomine pallide-aureo tectis; thorace spinis acutis duabus antice et postice armato; squama spinis duabus longis curvatis.  
*Worker.* Length  $2\frac{1}{2}$  lines. Black, the head and thorax with a thin silky cinereous pile, that on the abdomen of a pale golden hue, the antennæ and legs black without pile, and slightly shining. Thorax convex above, the anterior spines short, slender and acute; the meta-thoracic spines rather longer but equally slender and acute; the node of the peduncle with two long spines which are curved to the shape of the base of the abdomen; the latter globose. The thorax flattened transversely, but curved longitudinally. (Pl. I. fig. 7, and fig. 15 var. ?)  
*Hab.* Celebes (Tondano).
10. **POLYRHACHIS OLENUS.** *P. niger*; thorace supra deplanato, spinis duabus acutis anterioribus; squama spinis duabus longis armata; corpore aureo-sericeo vestito.  
*Worker.* Length 3 lines. Black and clothed with ashy silky pile; the palpi pale rufo-testaceous. Thorax flattened above, with the lateral

margins raised, armed in front with two divergent flattened acute spines; the metathorax truncate, and with the margin at the verge of the truncation acute and slightly raised; the node of the peduncle armed with two long acute divergent spines which curve backwards over the base of the abdomen; the latter globose. (Pl. I. fig. 8.)

*Hab.* Celebes (Tondano).

11. **POLYRHACHIS DEMOCLES.** *P. niger, aureo-sericeo vestitus; thorace ovato, metathorace spinis duabus brevibus obtusis; squama spinis duabus acutis armata.*

*Female.* Length  $3\frac{1}{2}$  lines. Black, covered with golden pubescent pile, the head and thorax thinly so. The thorax ovate; the verge of the truncation of the metathorax notched, the lateral angles forming short blunt spines; the node of the peduncle with two acute short spines, and in the middle of its upper margin with a notch, the angles of which are slightly elevated, forming two minute teeth or spines; the abdomen globose; the legs black and shining. (Pl. I. fig. 9.)

*Hab.* Celebes (Tondano).

12. **POLYRHACHIS VALERUS.** *P. capite abdomineque nigris; thorace, squama femoribusque rufis; thorace quadrispinoso; petioli squamula bispinosa.*

*Worker.* Length  $3\frac{1}{4}$  lines. Black, with the thorax, scale of the petiole, the coxæ, trochanters and femora ferruginous; the head opake, the face with short cinereous pubescence. The thorax with a thin shining cinereous pile; the spines on the thorax in front short, stout, and acute; the metathorax with two long slightly divergent spines directed backwards and tipped with black; the node of the peduncle with two long acute spines directed backwards over the base of the abdomen, their apex black. Abdomen globose and covered with silky pile, the extreme base, ferruginous. (Pl. I. fig. 10.)

*Hab.* Celebes (Tondano).

13. **POLYRHACHIS TRISPINOSUS.** *P. niger, lævis nitidusque; thorace inermi; petioli squama trispinosa.*

*Female.* Length 4 lines. Jet black, smooth and shining; the antennæ long and slender with the apical half ferruginous; the front of the head very convex. Thorax ovate, very delicately striated, the striæ, short and irregular, may be called a faint scratching; wings wanting; the node of the peduncle with three short acute spines above; the claws of the tarsi rufo-testaceous. Abdomen ovate and very smooth and shining. (Pl. I. fig. 11.)

*Hab.* Celebes (Tondano).

14. **POLYRHACHIS DIAPHANTUS.** *P. niger et vestitus pube argentea; thorace quadrispinoso; petioli squamula bispinosa.*

*Worker.* Length  $2\frac{1}{2}$  lines. Black, and densely clothed with silky silvery pile; the flagellum has the tips of the basal joints, and six or

seven of the apical joints entirely ferruginous; the thorax convex above, the anterior spines short, stout, and acute; the metathorax with two very stout, acute divergent spines; the node of the petiole with two long spines very stout, acute, and curving round the base of the abdomen; the abdomen globose. The anterior tibiæ obscurely ferruginous, their base black. (Pl. I. fig. 12.)

*Hab.* Celebes (Tondano).

15. *POLYRHACHIS AMANUS*. *P. niger*, lævis, nitidus; thorace antice et postice spinis duabus longis acutis armato; squama spinis duabus longis curvatis; femoribus basi pallide ferrugineis.

*Worker.* Length 3 lines. Jet black, smooth and shining, the thorax finely roughened and sub-opaque; head very prominent in front, tips of the mandibles and of the joints of the flagellum, as well as the palpi, rufo-testaceous, five or six of the apical joints of the flagellum entirely so. Thorax, the spines in front short, stout, acute, and curved inwards; those on the metathorax elongate, extending over the base of the abdomen and very acute; the spines on the node of the peduncle slender, very acute, and curved to the shape of the base of the abdomen; legs elongate, obscurely ferruginous, with the coxæ, trochanters, and base of the femora pale testaceous, the claws of the tarsi testaceous. Abdomen globose, highly polished and impunctate. (Pl. I. fig. 13.)

*Hab.* Celebes (Tondano).

16. *POLYRHACHIS CLEOPHANES*. *P. niger*, pube argentea vestitus; capite thoraceque rude punctatis, spinis acutis antice et postice armatis; petioli squamula bispinosa; femoribus basi ferrugineis.

*Worker.* Length  $3\frac{1}{4}$  lines. Black, the abdomen shining; head and thorax coarsely and closely punctured, rugose, and covered with silvery pubescent pile; the prominence on the front of the head, under the sides of which the antennæ are inserted, very much elevated; the eyes very prominent; the spines on the thorax in front short, divergent, stout, and acute; those on the metathorax more slender, acute, and curved backwards; the node of the peduncle with acute spines, which curve backwards over the base of the abdomen; the base of the femora more or less ferruginous, sometimes totally black. (Pl. I. fig. 14.)

*Hab.* Celebes (Tondano).

This is very probably the worker of *P. Vibidia*.

17. *POLYRHACHIS EXASPERATUS*. *P. niger*, capite thoraceque rude punctatis, abdomine nitido; thorace antice et postice spinis duabus longis acutis armato; squama spinis duabus longis curvatis acutis armata; pedibus obscure ferrugineis.

*Worker.* Length  $2\frac{3}{4}$  lines. Black; the head anteriorly, the mandibles and flagellum obscure ferruginous; the head, thorax, and node of the

peduncle very coarsely and closely punctured, producing a rugged surface. The thorax, with two short stout acute spines bent inwards, the metathorax with two long divergent acute spines; the peduncle with two long acute spines, which curve to the shape of the base of the abdomen; the legs ferruginous, more or less obscurely so. The abdomen globose, smooth, and shining. (Pl. I. fig. 15, and 16 var.)

*Hab.* Celebes (Tondano).

18. *POLYRHACHIS VIBIDIA*. *P. niger*, capite thoraceque rude punctatis; thorace ovato, antice posticeque abdominisque squama spinis duabus acutis armatis; abdomine ovato.

*Female*. Length  $3\frac{1}{2}$  lines. Black; the head and thorax with large deep punctures; the head with a large prominence in front, the lateral margins of which are expanded into elevated flat scales, beneath which the antennæ are inserted, the extreme tip of the latter pale rufo-testaceous; the eyes very prominent. Thorax ovate, with a short stout spine on each side in front; the metathorax with two stout acute spines, rather longer than the front ones; the node of the peduncle with two short divergent acute spines; the tibiæ and femora ferruginous, the apex of the latter and base of the former dusky or black; the claws of the tarsi rufo-testaceous. Abdomen globose, smooth and shining; the entire insect thinly covered with cinereous pubescent pile. (Pl. I. fig. 17.)

*Hab.* Celebes (Tondano).

19. *POLYRHACHIS CHAONIA*. *P. niger*, pube pallide aurea vestitus; thorace bidentato; petioli squamula bidentata; femoribus tibiisque ferrugineis; alis fusco-hyalinis.

*Female*. Length 4 lines. Black, and clothed with a cinereous pubescence, which has a pale golden lustre, particularly on the head and thorax; that on the abdomen is more inclining to grey, but has a golden tint in some lights; the mandibles black. Thorax armed in front with two short acute spines; the legs ferruginous, with the tarsi black; wings fusco-hyaline, nervures testaceous. Abdomen globose; the scale of the peduncle with two short stout spines. (Pl. I. fig. 18.)

*Hab.* Gilolo.

20. *POLYRHACHIS NUMERIA*. *P. niger*; thorace supra deplanato, spinis duabus anterioribus; abdominis squamula spinis duabus erectis acutis, utraque ad basin minute unispinulosa.

*Worker*. Length 3 lines. Black, and covered with silky cinereous pile; the thorax flattened above, and slightly curved longitudinally to the verge of the truncation of the metathorax, the spines on the prothorax stout, short and acute; the margins of the thorax slightly raised. Abdomen globose, truncate at the base; the node of the peduncle broad, transverse above with an erect spine at each lateral



angle, and a shorter acute spine outside at their base. (Pl. I. fig. 19.)

*Hab.* Celebes (Tondano).

21. *POLYRHACHIS HIPPOMANES*. *P. niger*; capite thoraceque opacis; abdomine nitido; thorace spinis duabus longis acutis postice armato; squama spinis duabus longis curvatis armata.

*Worker*. Length  $2\frac{1}{4}$  lines. Black, the head and thorax opaque, and obscurely tinged with blue. Thorax rounded above, the anterior margin unarmed; the metathorax with two long divergent spines; the node of the peduncle with two similar spines, which are curved and extend over the base of the abdomen; the trochanters and the intermediate and posterior coxæ pale rufo-testaceous; the legs elongate. The abdomen globose. (Pl. I. fig. 20.)

*Hab.* Celebes (Tondano).

22. *POLYRHACHIS LYCIDAS*. *P. niger*, pubescens; thorace supra deplanato, spinis duabus anterioribus; petioli squamula quadrispinosa.

*Worker*. Length 4 lines. Black with a thin silky cinereous pile, and sprinkled over with erect pale pubescence, which covers the antennæ and legs also; the extreme tip of the antennæ pale rufo-testaceous, the palpi of the same colour; the head and thorax longitudinally striated; the prothorax with two stout acute spines; the margins of the thorax slightly elevated and extremely acute at the angles of the truncation of the metathorax, sub-dentate; the node of the peduncle with four acute spines. Abdomen globose, with the base truncate. (Pl. I. fig. 21.)

*Hab.* Celebes (Tondano).

23. *POLYRHACHIS ZOPYRUS*. *P. niger*; prothorace bispinoso; petioli squamula quadrispinosa.

*Worker*. Length  $2\frac{3}{4}$  lines. Black, with a thin cinereous silky pile. Thorax, the anterior margin transverse, with the lateral angles very acute, and slightly produced into short acute spines; the sides of the thorax flat, the disk slightly convex, with the margins acute and slightly raised; the metathorax truncate, the angles of the truncation slightly produced, forming short acute spines; the anterior tibiæ more or less ferruginous within. Abdomen globose, the node of the peduncle with the superior margin transverse, the lateral angles raised into short acute teeth or spines; the sides of the node oblique outwardly, then abruptly inclined inwards to its base; at the angle thus produced is a short acute spine. (Pl. I. fig. 22.)

*Hab.* Celebes (Tondano).

24. *POLYRHACHIS EURYTUS*. *P. niger* cinereo-sericeo vestitus; thorace subovato, spinis duabus antice armato; squama emarginata.

*Female*. Length  $3\frac{3}{4}$  lines. Black, and covered with silvery grey pile, which is most dense on the face, metathorax, and abdomen. Thorax

sub-ovate, the metathorax truncate with the margin of the truncation acute; the prothorax with two short acute spines. Abdomen globose; the node of the peduncle widely emarginate above and subdentate at the angles. (Pl. I. fig. 23.)

*Hab.* Celebes (Tondano).

Gen. ODONTOMACHUS, *Latr.*

1. *Odontomachus rixosus*, *Smith, Proc. Linn. Soc.* ii. 64. 1.

*Hab.* Ternati; Singapore.

2. *Odontomachus sævissimus*, *Smith, Proc. Linn. Soc. Supp.* v. 102. 1.

*Hab.* Menado; Bachian; Ceram.

3. ODONTOMACHUS TYRANNICUS. *O. ferrugineus*, lævis nitidus; thorace oblongo, metathorace transversim striato; abdominis pedunculo unispinoso.

*Worker.* Length 4 lines to the tips of the mandibles. Ferruginous, very smooth and shining; the head widest at the insertion of the eyes, more than usually so; the usual deep depressions between the eyes and the prominence at the sides of which the antennæ are inserted very smooth without the faintest striation, the prominence slightly striated longitudinally; the head deeply emarginate behind; the mandibles finely serrated on their inner margins, and terminating in two stout teeth, which form a fork abruptly bent inwards. The antennæ and legs of a paler colour than the body; the metathorax transversely striated, the mesothorax above longitudinally so; the spine on the node of the peduncle of the abdomen short and acute. (Pl. I. fig. 4.)

*Hab.* Celebes.

Fam. PONERIDÆ, *Smith.*

Gen. PONERA, *Latr.*

1. *Ponera rugosa*, *Smith, Proc. Linn. Soc.* ii. 66. 5.

*Hab.* Celebes; Borneo.

2. *Ponera parallela*, *Smith, Proc. Linn. Soc.* iv. 143. 3.

*Hab.* Celebes; Aru.

3. *Ponera læviceps*, *Smith, Proc. Linn. Soc.* ii. 69. 13 ♂.

*Hab.* Celebes; Bachian; Borneo.

4. PONERA MALIGNA. *P. capite subquadrato*, margine posteriore transverso; thorace abdomineque lævigatis, nitidis; mandibulis, antennis tarsisque pallide ferrugineis.

*Female.* Length  $5\frac{1}{2}$  lines. Jet-black, smooth and shining; the posterior margin of the head transverse, with the lateral angles acute; the clypeus elevated; the head is sprinkled with distant punctures; its anterior margin, the mandibles, and antennæ ferruginous; the mandibles porrect, with two or three teeth at their apex and a larger one on their inner margin about one-third of their length from their apex.

Thorax oblong-ovate, with a few large scattered shallow punctures; the articulations of the legs and the tarsi ferruginous. Abdomen deeply constricted between the first and second segment, the apex rufo-testaceous; the node of the peduncle incrassate, subquadrate, rather widest behind; the entire insect is sprinkled with pale hairs, which are most dense on the abdomen, particularly at its apex.

*Worker.* This sex is rather smaller than the female, is less pubescent, and with fewer punctures; the metathorax narrower than the prothorax, and obtuse behind; the eyes are smaller, and, like those of the female, placed forwards at the sides of the head; the mandibles are similarly toothed; the colouring does not differ.

*Hab.* Celebes; Menado.

5. *PONERA NITIDA.* *P.* pallide ferruginea, lævis et nitida; margine mandibularum bidentato.

*Worker.* Length  $2\frac{1}{2}$  lines. Pale ferruginous, very smooth and shining; the eyes small, round, and placed forwards at the sides of the head; the mandibles porrect, with two stout short teeth on their inner margin. Thorax, with the sides flattened, above slightly convex; the metathorax oblong-quadrate above. The node of the peduncle quadrate and incrassate, as wide as the metathorax; the abdomen is constricted between the first and second segments, and has a few pale scattered hairs.

*Hab.* Celebes (Tondano).

6. *PONERA MUTABILIS.* *P.* ferruginea, lævis, nitida, chalybea, viridescens; abdomine rufo-fusco.

*Worker.* Length  $3\frac{1}{2}$  lines. Ferruginous; the head and thorax with tints of blue in certain lights; the mandibles longitudinally and finely striated, armed with three teeth at their apex, and a fourth on their inner margin a little way within; the eyes ovate and placed forwards at the sides of the head. Thorax compressed posteriorly; the scale of the peduncle flattened, rather thick, with its superior margin rounded. Abdomen slightly fuscous; the apical margin of the basal segment slightly constricted.

*Hab.* Celebes (Tondano).

This species resembles the *P. viridescens* from Sarawak, but is at once distinguished from it by its much shorter and thicker antennæ.

#### Gen. ECTATOMMA, *Smith.*

1. *Ectatomma rugosa*, *Smith, Proc. Linn. Soc.* iii. 143. 1.

*Hab.* Ceram; Aru.

#### Fam. MYRMICIDÆ, *Smith.*

##### Gen. MYRMICA, *Latr.*

1. *Myrmica molesta*, *Say, Bost. Journ. Nat. Hist.* i. 293. 6. (*Myrmica domestica*, *Shuck. Mag. Nat. Hist.* p. 268.)

*Hab.* Menado; Celebes; Britain; France; Brazil; North America.

2. *MYRMICA PEDESTRIS*. *M. fusco-nigra*; capite thoraceque longitudinaliter striatis; antennis pedibusque ferrugineis; abdomine lævi, nitidissimo.

*Female*. Length 3 lines. Nigro-fuscous; the head and thorax longitudinally striated, the striæ formed of rows of confluent punctures, the punctures finer on the head than on the thorax; the antennæ, anterior margin of the head and the mandibles ferruginous, the legs ferruginous. The thorax transverse anteriorly; a narrow smooth shining impunctate line runs down the middle; the metathorax unarmed. Abdomen oblong-ovate, smooth, shining, and delicately punctured; the nodes of the peduncle smooth and impunctate, the first oblong, the second globose.

*Hab.* Celebes (Tondano).

3. *MYRMICA RUFICEPS*. *M. fusco-nigra*; capite ferrugineo et longitudinaliter striato, thorace supra striato; abdomine lævi, nitidissimo.

*Female*. Length 4 lines. Black, the head red with a space behind the insertion of the antennæ regularly striated longitudinally, extending to the posterior margin; on each side of the striation the head is rugose; the mandibles stout, smooth and shining, with their inner margin black, smooth, and edentate; flagellum 12-jointed, the club 3-jointed. Thorax, the disk longitudinally striated, the scutellum smooth and shining, with a few transverse striæ behind; the metathorax with two short stout teeth; the tarsi and articulations of the legs pale rufo-testaceous. The petiole of the abdomen ferruginous, the nodes black, the first globose, the second transverse. Abdomen ovate, black, smooth, and shining.

*Hab.* Celebes (Tondano).

4. *MYRMICA FUSCIPENNIS*. *M. ferruginea*; capite thoraceque profunde punctatis; alis nigro-fuscis.

*Female*. Length 3 lines. Ferruginous, the head and thorax covered with large oblong punctures, the punctures occasionally confluent; the mandibles finely striated longitudinally, their inner margin furnished with a row of small black teeth; the joints of the antennæ, except the three apical ones, transverse; the apical joint longest, but not forming a club. Thorax, the metathorax with two short acute teeth; wings dark fuscous. Abdomen very smooth and shining, and much paler than the head and thorax.

*Hab.* Celebes (Tondano).

5. *MYRMICA PERTINAX*. *M. rufo-fusca*, nitida, sparse pilosa; capite longitudinaliter striato; metathorace mutico.

*Worker*. Length  $1\frac{1}{2}$ –2 lines. Rufo-fuscous, the head darker than the body; the anterior portion of the head and the antennæ bright rufo-ferruginous. The thorax smooth and shining, with a few fine punctures, the base and apex of the femora pale in some of the larger and darker examples; the abdomen pale at the base, the ex-

treme apex pale and pubescent. Smaller specimens are usually paler than large ones.

*Hab.* Celebes (Tondano).

6. *MYRMICA VEXATOR*. *M.* pallide flavo-testacea, lævis, nitidissima; abdomine apice fusco-nigro.

*Worker.* Length 1 line. Honey-yellow, very smooth and shining; the flagellum slightly fuscous towards the apex; the eyes small and placed forwards at the sides of the head; the metathorax not spined; the abdomen fuscous with the base pale.

*Hab.* Ternati.

This species resembles the House-ant, *M. molesta*; but it differs in several particulars from that species; its head is much larger, and it is entirely smooth and shining.

7. *MYRMICA INSOLENS*. *M.* testaceo-ferruginea, sparse pilosa; capite thoraceque longitudinaliter striatim rugosis; metathorace spinis parvis acutis armato.

*Worker.* Length  $1\frac{3}{4}$  line. Pale ferruginous; the head and thorax longitudinally, irregularly and roughly striated; the eyes and ocelli black; the antennæ with three joints in the club; the metathorax with two straight acute spines, which are situated at the sides of the truncation of the metathorax; the abdomen smooth and shining.

*Hab.* Menado.

8. *MYRMICA OPACA*. *M.* nigra, opaca, delicatule scabrosa; pedibus rufo-fuscis, tarsis pallide testaceis.

*Worker.* Length 2 lines. Opake-black, the head, thorax and nodes of the peduncle finely scabrous, on the head having a tendency to run into lines; behind the eyes is a longitudinal groove, apparently for the reception of the scape of the antennæ; the antennæ obscurely ferruginous with the tip pale; the mandibles ferruginous, striated and with several black teeth on their inner margin. Thorax armed posteriorly with two stout curved spines; the tarsi pale rufo-testaceous. The nodes of the peduncle large and globose; the abdomen thinly sprinkled with erect white setæ.

*Hab.* Celebes (Tondano).

#### Gen. CERAPACHYS, *Smith*.

1. *Cerapachys antennatus*, *Smith*, *Proc. Linn. Soc.* ii. 74. 1.

*Hab.* Celebes; Borneo.

#### Gen. CREMATOGASTER, *Lund*.

1. *CREMATOGASTER AMPULLARIS*. *C.* rufo-niger; capite thorace multum latiore; parte postica thoracis dilatata; abdomine cordato.

*Worker.* Length 2 lines. Obscure fusco-ferruginous; the antennæ, sides of the head, the nodes of the petiole, and the legs of a brighter

red; the head much wider than the thorax and more shining; the metathorax much swollen and wider than the prothorax, swelling out on each side. Abdomen heart-shaped, palest at the base and shining.

*Hab.* Celebes (Tondano).

The swollen metathorax in this species, I apprehend, is a receptacle for saccharine fluid; on each side is a small orifice, and beneath it, adhering to the thorax, are particles of crystallized masses, apparently formed of the fluid which has exuded from the receptacle. Two species from Sarawak, having similar formations, are described in the second volume of the 'Proceedings of the Linnean Society.'

Fam. ATTIDÆ, *Smith*.

Gen. SOLENOPSIS, *Westw.*

1. *Solenopsis cephalotes*, *Smith*, *Proc. Linn. Soc.* iii. 149. 1.

*Hab.* Celebes; Aru.

The *worker major* of this species has the head greatly enlarged, that of the *worker minor* being of the ordinary size.

2. *SOLENOPSIS LABORIOSA*. *S. ferruginea*; capite maximo, longitudinaliter striato, postice transverso-striato; spinis metathoracis minutissimis.

*Worker major*. Length 3 lines. Dark ferruginous, with the legs pale; rufo-testaceous; the head very large, twice as wide as the abdomen, in front and at the sides roughly striated, posteriorly delicately striated; the sides of the head very slightly rounded, emarginate behind with a central impressed line running forwards and terminating opposite the eyes; the eyes very small and placed at the sides a little beyond the middle; the vertex smooth and shining, with a few scattered fine punctures. Thorax sub-rugose, convex anteriorly and shining, behind constricted and narrowed; the metathorax with two short, erect, acute spines. Abdomen smooth, shining and slightly pubescent. The mandibles have a single tooth at their apex.

*Worker minor*. Length 1-2 lines. This form is of a much paler colour, the larger individuals having the abdomen fuscous, except at the extreme base; in the smaller examples it is only fuscous at the apex; in large individuals the head is slightly striated in front, in small ones it is entirely smooth and shining; the head much smaller in proportion than in the *worker major*; the mandibles with two or three teeth on their inner margin.

*Hab.* Celebes (Tondano).

The different-sized workers were taken from the nest by Mr. Wallace.

3. *SOLENOPSIS PUNGENS*. *S. ferruginea*; capite maxime longitudinaliter striato; abdomine fusco (*operaria major*): rufo-testacea, lævis, tota nitidissima nuda flagellis pedibusque pallescentibus (*operaria minor*).

*Worker*. Length 2 lines. Ferruginous, the flagellum and legs pale ferruginous; the mandibles stout, finely punctured and with two

teeth at their apex; the head very large, longitudinally striated, and with a longitudinal channel behind the scape of the antennæ apparently for their reception; the eyes small, inserted forwards at the sides of the head. The metathorax, with two minute spines; the legs pale rufo-testaceous. Abdomen fuscous, smooth and shining.

*Worker minor.* Length 1 line. Rufo-testaceous, the antennæ, thorax, and legs pale testaceous; the head of the ordinary size; entirely smooth and shining.

*Hab.* Menado.

#### Gen. PHEIDOLE, *Westw.*

##### 1. *Pheidole megacephala*, *Smith, Proc. Linn. Soc. Supp.* v. 112. 5.

Mr. Wallace has sent a series of workers of this species collected from the nest. These contain, as it were, three modifications of the enormously large-headed individuals; all of these have heads similar in form, subquadrate, longitudinally striated anteriorly, and transversely so behind; these I should call varieties of the *worker major*; the *worker minor* has the head subovate in form, smooth, polished and shining; not striated behind, and very faintly so anteriorly. The links which would unite these two distinct forms of the working ants are wanting. I am therefore still of opinion that societies of ants generally possess two distinct sets of workers whose functions are totally different; this is known to be the case in slave-making communities, and also in the remarkable genus *Eciton*, of which only the workers are known.

##### 2. *Pheidole plagiaria* (*Smith, Proc. Linn. Soc. Supp.* v. 112. 3).

*Hab.* Celebes; Bachian.

The specimens from Celebes are of a darker hue than those received from Bachian; this is the ant which Mr. Wallace saw carrying off white ants to its formicarium.

#### Gen. TYPHLATA, *Smith.*

##### 1. *Typhlatta læviceps*, *Smith, Proc. Linn. Soc.* ii. 79. 1.

This remarkable genus of ants, the workers of which are destitute of eyes, is in my opinion closely allied to the genus *Eciton*, one or two species of which are also blind; the present species is very like the *Eciton pachycerus* of my Catalogue of Formicidæ, which is also blind. That species was collected by General Hardwick, and formed part of his collection, which he presented to the British Museum; I have little doubt it was captured in India, although South America (?) is given as its probable habitat. This genus differs from *Eciton* in having only two joints to the labral palpi; the maxillary palpi I have not succeeded in extracting.

#### Fam. CRYPTOCERIDÆ, *Smith.*

##### Gen. CATAULACUS.

##### 1. *CATAULACUS FLAGITOSUS*. *C. niger*; capite striato, angulis posticis

spinosis; thorace spinis duabus acutis elongatis armato; abdomine cordato.

*Worker.* Length  $2\frac{1}{2}$  lines. Opaque-black; the head and thorax above, with a coarse irregular striation, intermixed with a rough granulation, the margins of the head crenulated, the posterior angles acute and slightly produced. Thorax armed posteriorly with two stout diverging spines. Abdomen oblong-cordate, finely and irregularly striated; sprinkled with distant short white erect setæ; the nodes of the peduncle rugose.

*Hab.* Celebes (Tondano).

#### Gen. ECHINOPLA, *Smith*.

1. *Echinopla striata*, *Smith, Proc. Linn. Soc.* ii. 80. 3.

*Hab.* Celebes; Malacca.

2. *Echinopla pallipes*, *Smith, Proc. Linn. Soc.* ii. 80. 2.

*Hab.* Celebes; Borneo.

3. *ECHINOPLA DUBITATA*. *E. nigra*; capite thoraceque rugosis; abdomine ovato lævi nitido; squama in utroque latere spina horizontali; femoribus pallide testaceis.

*Worker.* Length 2 lines. Black, and thinly covered with erect black hairs; the head and thorax rather finely rugose; the antennæ pubescent, with the extreme tip pale testaceous; the eyes round and very prominent. The anterior margin of the prothorax arched with a short acute spine at the lateral angles; the thorax is deeply constricted in the middle, the metathorax rounded behind; the roughness of the thorax gives its margins a crenulated appearance; the coxæ, trochanters, and base of the femora pale rufo-testaceous; the claw-joint of the tarsi rufo-testaceous. Abdomen globose, shining, and very finely punctured.

*Hab.* Celebes (Tondano).

#### Fam. MUTILLIDÆ, *Leach*.

##### Gen. MUTILLA.

1. *Mutilla Merops*, *Smith, Supp. Journ. Proc. Linn. Soc.* v. 115. 2.

*Hab.* Gilolo; Bachian.

2. *Mutilla anthylla*, *Smith, Supp. Journ. Proc. Linn. Soc.* v. 115. 4.

*Hab.* Gilolo; Bachian.

3. *Mutilla Ianthæa*, *Smith, Proc. Linn. Soc. Supp.* v. 115. 3.

*Hab.* Amboyna; Bachian.

##### Gen. METHOCA, *Latr.*

1. *METHOCA THORACICA*. *M. rufo-ferruginea*; capite abdominisque fasciis tribus nigris.



*Female.* Length 4 lines. Rufo-ferruginous; the head black, the abdomen with three black fasciæ, very smooth and shining; the mandibles, clypeus, and antennæ ferruginous. (Pl. I. fig. 5. ♀.)

*Hab.* Celebes (Tondano).

This very beautiful insect may probably be a very large, highly coloured form of *M. insularis*, described in a previous paper; but not having any intermediate in size, I have thought it advisable to describe it as a distinct species.

## Fam, THYNNIDÆ, *Erich.*

### Gen. THYNNUS.

1. *THYNNUS ATRATUS*. *T. niger*, punctulatus; alis anticis fusco-nigris, apice hyalinis, posticis hyalinis, basi late fusco-nigris.

*Female.* Length 12 lines. Black and closely punctured; the head and thorax slightly shining, the thorax very shining, and not so strongly and closely punctured as the thorax; the anterior margin of the clypeus widely and slightly emarginate. The wings very dark brown, shining, and with their apical margins, and the posterior margin of the hind wings hyaline; the legs black with short cinereous pubescence within.

*Hab.* Gilolo.

This fine species of *Thynnus* is of the same form, and about the same size, as Guérin's *T. Shuckardi*; it is the second species that has to my knowledge been captured in the Eastern Archipelago; the first species was described in the paper descriptive of the insects of Bachian, &c., published in the supplement to the fifth volume of the 'Proceedings.'

2. *THYNNUS (AGRIOMYIA) VAGANS*. *T. niger*, capite thoraceque flavo variegatus, abdominis segmentis maculis duabus flavis; alis subhyalinis.

*Male.* Length  $6\frac{1}{2}$  lines. Black, the head and thorax subopaque, the abdomen shining; the mandibles, clypeus and a V-shaped mark above yellow; the base of the clypeus and an anchor-shaped mark in the middle black. Thorax, the collar, posterior margin of the prothorax, a spot on the tegulæ, two beneath the wings, a minute one on the mesothorax, three on the scutellum, and one on each side of the metathorax yellow; the anterior tibiæ and the intermediate pair in front ferruginous; the wings subhyaline, the nervures black. The abdomen has an oblong yellow spot at the sides of all the segments except the two apical ones.

*Female.* Length 4 lines. Apterous; black, the head small, transverse in front, much narrowed behind, with a deep longitudinal sulcation on each side close to the margin of the eyes. The thorax narrow and oblong. Abdomen oblong-ovate, very large, with four deep transverse grooves on the second segment. (Pl. I. fig. 1 ♂, 2 ♀.)

*Hab.* Gilolo.

The sexes here described are distinguished as such by Mr. Wallace, who doubtless captured them *in coitu*.

Fam. SCOLIADÆ, *Leach*.

Gen. TIPHIA, *Fabr.*

1. *Tiphia flavipennis*, *Smith, Proc. Linn. Soc. ii. 91. 3.*

*Hab.* Gilolo. Sarawak.

Gen. SCOLIA, *Fabr.*

Div. 1. *Two submarginal cells and one recurrent nervure.*

1. *SCOLIA CAPTIVA*. *S. atra*, thorace abdomineque opalino pulcherrime lavatis; alis fuscis cupreo iridescentibus.

*Male*. Length 10 lines. Black, with a beautiful opaline iridescence intermixed with shades of blue, purple, and green, thinly covered with black pubescence, which is most dense on the sides of the thorax, legs, sides and apex of the abdomen; finely and distantly punctured; the spines of the apex of the tibiæ simple; wings fuscous, not very dark, and having a mixture of coppery and greenish iridescence. Abdomen: the first segment bell-shaped, much narrower than the following; the punctures on the abdomen fine and not very close, the apex smooth and opake.

*Hab.* Gilolo.

2. *SCOLIA AMBIGUA*. *S. nitida nigra*, abdomine opaco, alis fuscis cupreo et violaceo splendide micantibus.

*Female*. Length 12 lines. The head and thorax shining black; the face and vertex thickly set with black pubescence; a patch of silvery white pubescence between the base of the scape and the inner margin of the eyes; the cheeks have also a little silvery pile; the mandibles rufo-piceous on their inner margins. The sides of the thorax, beneath as well as the metathorax with a thin cinereous pile; the disk of the thorax smooth and shining; the anterior margin of the prothorax with deep coarse punctures; the legs thickly set with rigid black hairs; the posterior femora broad, compressed, and membranaceous beneath; the inner spine at the apex of the tibiæ spatulate; all the calcariae rufo-testaceous; the wings fusco-hyaline, with a splendid violet and coppery iridescence. Abdomen opake black with the basal margins of the segments slightly shining; the terminal segment longitudinally rugose with its apical margin narrowly pale testaceous; the anterior wings with a second recurrent nervure incomplete.

*Hab.* Gilolo.

Div. 2. *The anterior wings with two submarginal cells and two recurrent nervures.*

3. *Scolia auricollis*, *St. Farg. Hym. iii. 499. 6 ♀.*

*Hab.* Ternati; Bachian; Philippines; Ceylon; Silhet.

4. *Scolia annulata* (Tiphia Fabr.), *Syst. Piez.* p. 234. 11.

*Hab.* Celebes.

The specimens from Celebes have the wings entirely dark fuscous.

5. *SCOLIA MOROSA*. *S. nitida*, *atterima*; abdomine subopaco; alis nigro-fuscis, violaceo splendide micantibus.

*Female*. Length  $14\frac{1}{2}$  lines. Jet black, the head and thorax shining, the abdomen subopaque. The face coarsely rugose and covered with dense black pubescence; the flagellum rufo-piceous beneath. The thorax with deep coarse punctures and having a smooth impunctate space in the middle of the disk and of the scutellum; the legs thickly set with rigid spines and hairs: the anterior tibiæ strongly punctured; the apical joint of the anterior and intermediate tarsi rufo-piceous; the wings very dark brown with a splendid violet iridescence. Abdomen strongly punctured towards the apex.

*Hab.* Celebes (Tondano).

Div. 3. *The anterior wings with three submarginal cells and one recurrent nervure.*

6. *SCOLIA APICATA*. *S. capite thoraceque nigris*, abdomine nigro-ceruleo, apice ferrugineo; alis nigro-fuscis violaceo iridescentibus.

*Female*. Length  $7\frac{1}{2}$  lines. Head and thorax black and shining; head as wide as the thorax, finely and distantly punctured on the vertex, but much more strongly so before the ocelli. Thorax strongly punctured; the wings dark brown with a violet iridescence. Abdomen blue-black, rather finely and distantly punctured, the three apical segments bright ferruginous and thickly ciliated with ferruginous pubescence.

*Hab.* Celebes (Tondano).

I at first mistook this insect for *S. dimidiata*; but, independent of the different neuration of the wings, its broad head, as wide as the thorax, at once distinguishes it; in *S. dimidiata* the head is much narrower than the thorax.

7. *SCOLIA INTRUDENS*. *S. nigra*, subnitida, punctatissima; alis fuscis, viride et violaceo micantibus.

*Male*. Length  $14\frac{1}{2}$  lines. Black, slightly shining and densely punctured; the pubescence black. The thorax with confluent punctures; the wings dark fuscous, with a mixture of green violet and coppery iridescence, changing in different lights. The abdomen with the segments densely fringed with black pubescence; the terminal segment with an acute spine at the apex and a shorter one on each side at the base.

*Hab.* Celebes (Tondano).

Div. 4. *The anterior wings with three submarginal cells and two recurrent nervures.*

8. *Scolia dimidiata*, Guér. *Voy. Coq. Zool.* ii. pl. 2. p. 247.

*Hab.* Gilolo; Celebes; Isle of Bourou; Bachian; Amboyna; Senegal.

Specimens of this species from Gilolo and Bachian are much more highly coloured than the type described by Guérin,—the abdomen being red, with only the basal segment and the sides of the second segment black.

9. *Scolia fulva*, Gray; *Cuv. Anim. Kingd. (Griffiths)*, p. 516, pl. 71. f. 1 ♀.

*Hab.* Ceram.

The *Scolia fulva* is so briefly described in the above work, that it appears desirable to add one or two important distinctive characters. The head and thorax are black, the abdomen ferruginous, and entirely covered with fulvous pubescence; the antennæ and legs are ferruginous, the coxæ and femora fusco-ferruginous; the wings in the specimen from Ceram are nigro-violaceous: in the figure given in the 'Animal Kingdom,' they are represented as paler, being fuscous and iridescent at their base, with the margins paler; the basal segment of the abdomen is black, the second segment has a black oval spot at its lateral margins; the third segment has two approximating ovate black spots in the middle above, and the fourth two united ones in the same situation; the type is said to have come from Brazil, but it has been ascertained that Australia is its proper locality.

#### Fam. POMPILIDÆ, *Leach*.

1. POMPILUS PRÆDATOR. *P. niger*, abdomine obscure cæruleo, alis fuscis, violaceo iridescentibus.

*Female.* Length 6 lines. Head and thorax black and slightly shining, the clypeus covered with silvery pile; the mandibles rufo-piceous in the middle. The metathorax subelongate with its apical margin reflexed; the wings fuscous, with a violet iridescence, the posterior pair hyaline at their base. Abdomen smooth and shining, with a beautiful blue tint in certain lights; the apical segment with a number of long black hairs.

*Hab.* Menado.

2. POMPILUS RUFIFRONS. *P. capite vertice, antennis, tibiis tarsisque ferrugineis; abdominis segmento secundo fascia basali ferruginea; alis flavis.*

*Female.* Length 9 lines. Black; the front between the ocelli and the insertion of the antennæ, the antennæ, labrum, tibiæ, and tarsi ferruginous; the mandibles ferruginous in the middle; the tips of the femora ferruginous; wings yellow, with a narrow fuscous border at their tips; the nervures ferruginous. Abdomen slightly shining, the basal margin of the second segment ferruginous.

*Hab.* Ternate.

#### Gen. AGENIA, *Schiodte*.

1. AGENIA Lucilla, *Smith, Proc. Linn. Soc. v. 120. 3.*

*Hab.* Gilolo; Amboyna.

#### Gen. PRIOCNEMIS, *Schiodte*.

1. Priocnemis confector, *Smith, Proc. Linn. Soc. v. 120. 3.*

*Hab.* Ternate; Bachian.

Gen. MYGNIMIA, *Smith*.

1. *Mygnimia ichneumoniformis* (Pompilus), *Guér. Voy. Coq. Zool.* ii. 258.  
*Hab.* Celebes; Dory; Amboyna.

2. *Mygnimia fervida*, *Smith, Proc. Linn. Soc. Supp.* v. 82. 1.  
*Hab.* Makassar; Ceram.

3. MYGNIMIA COGNATA. *M. atra*; metathorace rugoso; alis nigro-fuscis cupreo violaceoque micantibus.

*Female.* Length 10 lines. Black; the head and thorax covered with black pubescence; the anterior margin of the clypeus entire; the anterior tibiae and tarsi with a few very short slender spines; the metathorax convex, pubescent, and rugose, the wings very dark brown, with their apical margins of a deeper tint. Abdomen longitudinally aciculate.

*Hab.* Ternate.

This species is very like *M. anthracina*, but I think it is a distinct species; it has not the deep transverse ridges on the metathorax which characterise that insect, and it also differs in having the abdomen very obviously aciculate, or irregularly finely striated longitudinally.

Gen. MACROMERIS, *St. Farg.*

1. *Macromeris violacea*, *St. Farg. Guérin's Mag. Zool.* pl. 30. fig. 1, ♂.  
*Hym.* iii. 462, 2.

*Hab.* Gilolo; Celebes; Aru; Borneo; Java; Malacca; New Guinea; Assam; Ceram.

Fam. SPHEGIDÆ, *Leach*.Gen. SPHEX, *Fabr.*

1. *Sphex sericea*, *Fabr. Syst. Piez.* p. 211. 19.

*Hab.* Ternate; Bachian; Aru; Celebes; Malacca; Borneo; Java; Philippines,

2. *Sphex argentata*, *Dahlb. Hym. Europ.* i. 25. 1.

*Hab.* Gilolo; Celebes; Bengal; Aru; Sumatra; Java; Bachian; Congo; Sierra Leone.

3. *Sphex nigripes*, *Smith, Cat. Hym.* pt. 4. 254. 59.

*Hab.* Gilolo; Celebes; Singapore; Sumatra; China.

4. *Sphex tyrannica*, *Smith, Proc. Linn. Soc.* v. 122. 5.

*Hab.* Gilolo; Menado; Bachian; Kaisaa.

5. SPHEX FEROX. *S. nigra*, capite thoraceque pube fulva vestita; abdomine basi pedibusque ferrugineis, tarsis nigris; alis subhyalinis marginibus apicalibus fuscis.

*Male.* Length 10 lines. Black; the femora, tibiae, and two basal segments of the abdomen ferruginous; the petiole black; the head and thorax densely clothed with fulvous pubescence; the clypeus widely,

but slightly, emarginate; the 2nd joint of the funiculus very slender at its base; wings sub-hyaline, the apical margins of the anterior pair slightly fuscous, the nervures dark brown.

*Hab.* Amboyna; Celebes.

Gen. PELOPÆUS, *Latr.*

1. *Pelopæus Bengalensis*, *Dahlb. Hym. Europ.* i. 433. 2.

*Hab.* Ternate; Celebes; Isle of France; India; Philippines; China.

2. *Pelopæus lætus*, *Smith, Cat. Hym. Ins.* pt. 4. 229. 13.

*Hab.* Ternate; Port Essington; Swan River.

Gen. TRIROGMA, *Westw.*

1. *Trirogma cærulea*, *Westw. Trans. Ent. Soc. Lond.* iii. 225, ♂. *Ar-  
cana Ent.* ii. 66, ♀.

*Hab.* Menado; India; Singapore; Celebes.

Fam. LARRIDÆ, *Leach.*

Gen. LARRADA, *Smith.*

1. *LARRADA CHRYSOBAPTA*. *L. fusco-nigra*, capite, thorace abdominis-  
que basi et zona abdominali media pube aurea densissima sericeo-  
velutina vestitis; alis hyalinis flavo-tinctis apice violascenti-fuscis.

*Female.* Length  $6\frac{1}{2}$  lines. The head, thorax, and legs clothed with golden silky pubescent pile, that on the femora has a silvery lustre; antennæ black, with a pale golden pile on the scape; mandibles shining black, with a little golden pubescence at their base; the wings flavo-hyaline, with a fuscous cloud at their apex, which has a violet-tint in certain lights. Abdomen: the first segment and a band on the following segments with golden pubescence.

*Hab.* Celebes (Tondano).

Fam. BEMBICIDÆ, *Westw.*

Gen. BEMBEX, *Fabr.*

1. *Bembex melancholica*, *Smith, Cat. Hym.* pt. 4. 328. 47.

*Hab.* Celebes; Borneo; Sumatra; Aru.

2. *Bembex trepanda*, *Dahlb. Hym. Europ.* i. 181.

*Hab.* Gilolo; Celebes; Ceylon; India.

Fam. CRABRONIDÆ, *Leach.*

Gen. TRYPOXYLON, *Latr.*

1. *Trypoxylon providum*, *Smith, Proc. Linn. Soc. Supp.* v. 125. 1.

Fam. PHILANTHIDÆ, *Dahlb.*Gen. PHILANTHUS, *Fabr.*

1. *PHILANTHUS NOTATULUS*. *P. niger*, facie genisque flavo-lineatis, thorace flavo subnotato, abdominis petiolo binotato, segmentis flavo postice marginatis, medio interrupto, tibiis antice flavis, antennis nigris.

*Female*. Length  $5\frac{1}{4}$  lines. Black; the head and thorax closely punctured; the inner orbits of the eyes below their sinus, and the anterior margin of the face and clypeus with a yellow line; an ovate spot in the middle of the clypeus, a bilobed spot above it, and an oblique stripe on the cheeks, yellow. Thorax: an interrupted line on the collar, a spot beneath the wings, another on the tegula in front; a transverse line in the middle of the scutellum, and two ovate spots on the metathorax, near the insertion of the petiole, yellow; the wings hyaline, the nervures fuscous; the tibiae in front, the posterior pair behind also, the knees and the tarsi beneath, yellow, the latter rufo-fuscous above. Abdomen petiolated; the petiolated segment with an ovate spot on each side near its apex; the following segments narrowly bordered with yellow, slightly interrupted in the middle; the first border widens into a pear-shaped spot towards the lateral margins; beneath, the second and third segments have a transverse curved line on each side.

*Hab.* Menado.

This species belongs to Klug's subgenus *Trachypus*.

Group I.—*SOLITARY WASPS*.Fam. EUMENIDÆ, *Westw.*Gen. EUMENES, *Latr.*

1. *Eumenes tinctor*, *Christ. Hym.* p. 341. t. 31. f. 1. *Sauss. Mon. Guêpes Sol.* p. 49. 30.

*Hab.* Gilolo; Senegal; Congo; Gambia; Egypt.

2. *Eumenes Praslina*, *Guér. Voy. Cog. Zool.* ii. 267. pl. 9. fig. 7, ♀.

*Hab.* Ternate; Gilolo; Kaisaa; New Ireland; Key Island; Amboyna.

3. *Eumenes Urvillei*, *Sauss. Mon. Guêpes Sol.* i. 59. 44.

*Hab.* Gilolo; New Guinea.

4. *Eumenes cirinalis*, *Fabr. Syst. Piez.* p. 286. 4.

*Hab.* Gilolo; Kaisaa; Celebes; Ceram; Sumatra; Java; India.

5. *Eumenes tricolor*, *Smith, Proc. Linn. Soc.* v. 87. 5.

*Hab.* Gilolo; Bachian; Makassar.

6. *Eumenes blandus*, *Smith, Proc. Linn. Soc. Supp.* v. 127. 8.

*Hab.* Gilolo; Bachian.

Gen. PACHYMENES, *Sauss.*

1. *Pachymenes elegans*, *Smith, Proc. Linn. Soc. Supp.* v. 131. 1.

*Hab.* Gilolo; Bachian.

Gen. ODYNERUS, *Latr.*

1. *Odynerus maculipennis*, *Smith, Proc. Linn. Soc.* ii. 3. 4.

*Hab.* Gilolo; Borneo.

2. *ODYNERUS FALLAX.* *G. niger*, clypeo apiculato, capite thoraceque flavo variis; pedibus ferrugineis; abdominis segmentis flavofasciatis; alis subhyalinis apice fuscis.

*Female.* Length  $6\frac{1}{2}$  lines. Black; the clypeus, a spot above, another in the sinus of the eyes, a line behind the eyes, and a minute spot on the mandibles, yellow; a kite-shaped black spot on the clypeus; the scape reddish yellow in front. Thorax: a line on the collar, a spot beneath the wings; the tegulæ, an abbreviated line before them, two spots on the scutellum, postscutellum, and at the apex of the metathorax on each side of the insertion of the abdomen, yellow; the legs ferruginous; the wings subhyaline and iridescent, with a dark fuscous stain extending from the marginal cell to the apex of the wings; the abdomen petiolated; the margins of the segments bordered with yellow.

*Hab.* Gilolo.

Gen. RHYNCHIUM, *Spin.*

1. *Rhynchium hæmorrhoidale*, *Fabr. Syst. Piez.* p. 259. 28.

*Hab.* Gilolo; Bachian; Amboyna; Dory; Malacca; Singapore; India; Java; Cape of Good Hope.

2. *Rhynchium rubro-pictum*, *Smith, Proc. Linn. Soc. Supp.* v. 128. 4.

*Hab.* Gilolo; Ternate; Bachian.

## Group II.—SOCIAL WASPS.

Fam. VESPIDÆ, *Leach.*Gen. POLISTES, *Latr.*

1. *Polistes tepidus*, *Fabr. Syst. Piez.* p. 371. 7.

*Hab.* Gilolo; Bachian; Key; Solomon Islands; New Guinea; Australia.

2. *Polistes multipictus*, *Smith, Proc. Linn. Soc. Supp.* v. 130. 5.

*Hab.* Gilolo; Amboyna.

Gen. ISCHNOGASTER, *Guér.*

1. *ISCHNOGASTER AURIFRONS.* *I. niger*, flavo variegatus; petiolo



longissimus; cellulis primis secundisque submarginalibus æquis, tertia quadrata; facie aurato pubescente.

*Female.* Length  $6\frac{1}{2}$  lines. Black; the face covered with golden pubescence; the scape and the flagellum beneath rufo-fulvous; the mandibles and palpi rufo-testaceous. Thorax globular; the posterior margin of the prothorax, a spot beneath the wings, another on the side of the pectus, two on the scutellum and two united ones on the metathorax, yellow; the legs rufo-piceous, with the knees yellow. The petiole obscurely ferruginous, twice as long as the thorax, the apex swollen; the first segment of the abdomen has a short petiole, which is pale ferruginous; the second segment has at its basal margin on each side an oblong yellow spot; beneath, the same segment has two small yellow spots.

*Hab.* Celebes (Tondano).

#### Gen. VESPA, *Linn.*

1. *Vespa affinis*, *Fabr. Syst. Piez.* p. 254 (var. *V. cincta*?).

*Hab.* Gilolo; Bachian; Celebes; Malacca; Singapore; India; China.

#### Fam. ANDRENIDÆ, *Leach.*

##### Gen. PROSOPIS.

1. *Prosopis eximius*, *Smith, Supp. Journ. Proc. Linn. Soc.* v. 131. 1.

*Hab.* Gilolo; Bachian.

##### Gen. NOMIA, *Latr.*

1. *NOMIA CLAVATA.* *N. nigra et punctata*, facie pube brevi grisea tecta; abdomine clavato, nitido, marginibus apicalibus segmentorum albo fasciatis.

*Male.* Length  $3\frac{1}{2}$  lines. Black; head and thorax opaque; the face covered with cinereous pubescence; the mandibles ferruginous at their apex. The collar, scutellum and post-scutellum bordered with short downy pale pubescence; the wings subhyaline and iridescent, the apical margins of the superior pair fuscous; the legs obscurely rufo-piceous, the tarsi pale rufo-testaceous; the legs with a glittering pale pubescence. Abdomen clavate, the margins of the segments constricted, each having a fascia of pale pubescence on its apical margin.

*Hab.* Gilolo.

2. *NOMIA MODESTA*, *N. nigra*; capite thoraceque punctatis subopacis, abdomine nitido, segmentis ad marginem apicalem albo fasciatis.

*Female.* Length 3 lines. Black; the face covered with glittering cinereous pubescence; the flagellum fulvous beneath; the mandibles

rufo-piceous at their apex. Thorax finely and closely punctured, and, as well as the head, subopaque; the prothorax and scutellum bordered with short, fine, downy, pale pubescence; the wings subhyaline and iridescent; the tegulæ pale rufo-testaceous; the legs with a pale glittering pubescence, the tarsi pale ferruginous. Abdomen ovate, very convex, and wider than the head and thorax, the apical margins of the segments bordered with short white pubescence, widely interrupted on the first and second segments; the abdomen is shining and very finely punctured.

*Hab.* Gilolo.

Fam. APIDÆ, *Leach*.

Gen. MEGACHILE, *Latr.*

1. *Megachile Alecto*, *Smith, Supp. Journ. Proc. Linn. Soc.* v. 132.

*Hab.* Gilolo; Dory; Ternate.

2. *Megachile Lachesis*, *Smith, Supp. Journ. Proc. Linn. Soc.* v. 133.

*Hab.* Gilolo; Bachian; Amboyna.

3. *Megachile Clotho*, *Smith, Supp. Journ. Proc. Linn. Soc.* v. 134.

*Hab.* Gilolo; Bachian.

4. MEGACHILE ATERRIMA. *M. aterrima*, pube nigra dense vestita; thorace transversim rugoso; alis hyalinis, apice marginalibus fuscis.

*Female.* Length 11 lines. Black; the pubescence entirely black; the head rugose; the mandibles stout and finely punctured. Thorax rugose, transversely so in front; the posterior margin of the scutellum rounded; the wings hyaline, the nervures black, the apical margins with a fuscous border. Abdomen with a dense black pubescence beneath, above bluish black towards the base, finely punctured.

*Hab.* Celebes (Tondano).

5. MEGACHILE PLACIDA. *M. nigro-pubescentis*; facie dense flavo-albo pubescente, abdominis segmentis marginibus fulvis; alis fuscis.

*Male.* Length 5 lines. The head, thorax, and legs clothed with black pubescence, that on the face is yellowish white; the wings slightly fuscous, with their base hyaline. The margins of the first and three following segments of the abdomen fringed with fulvous pubescence, the fifth and following segments entirely fulvous; the anterior tarsi and the femora and tibiæ beneath rufo-testaceous, their coxæ armed with a stout spine.

*Hab.* Gilolo.

6. MEGACHILE LABORIOSA. *M. nigra*, pube nigra vestita; abdomine segmentis apicalibus pube fulva vestitis; alis nigro-fuscis.

*Male.* Length 5 lines. Black, and clothed with black pubescence, the fourth and following segments of the abdomen with fulvous; a tuft of white pubescence between the antennæ, and the anterior margin of the clypeus fringed with white pubescence; the wings dark fuscous.

*Hab.* Ternate.

## Gen. CROCISA.

1. *Crocisa nitidula*, *Fabr. Syst. Piez.* p. 386. 2.

*Hab.* Gilolo; Ternate; Aru Islands; Amboyna; Australia; Menado.

2. *Crocisa emarginata*, *St. Farg. Hym.* ii. 449. 3.

*Hab.* Ternate; Port Praslin (New Ireland).

## Gen. XYLOCOPA.

1. *Xylocopa coronata*, *Smith, Supp. Journ. Proc. Linn. Soc.* v. 135. 1.

*Hab.* Gilolo; Kaisaa.

2. *XYLOCOPA VOLATILIS*. *X.* virescenti-flava, tibiis posticis intus rubro-hirtis; alis obscuro-hyalinis, violaceo tinctis, apice nigro minute et regulariter crebre punctatis.

*Male.* Length 11 lines. Black, and densely clothed with short greenish-yellow pubescence; the scape in front and the flagellum beneath yellow; a yellow line down the middle of the clypeus, and its anterior margin narrowly yellow. The wings subhyaline, with the margins broadly fuscous, and having a beautiful violet iridescence; the tip of the abdomen and the posterior tarsi within rufo-fulvous pubescence.

*Hab.* Menado.

3. *XYLOCOPA DIVERSIPES*. *X.* capite, thorace, abdominis basi, pedibus anticis et medianis fulvo-hirtis, abdominis dorso medio, pedibus posticis nigris; abdominis apice rufescenti-fulvo hirtis; tibiis posticis apice rufo-hirtis; alis obscure hyalinis apice fuscis et violaceo iridescentibus.

*Male.* Length 12 lines. Black; the head, thorax, base of the abdomen, and the anterior and intermediate legs clothed with fulvous pubescence; that on the intermediate tarsi rufo-fulvous, and forming a long fringe; the clypeus, a spot above it, the scape in front, and flagellum beneath, yellow; the wings subhyaline; the margins of the wings fuscous, with a beautiful violet iridescence, the nervures ferruginous. The apical half of the second segment of the abdomen, and the third, fourth, and fifth, clothed with black pubescence; the apical segments with bright fulvous-red pubescence; the posterior legs clothed with black pubescence the tarsi beneath with bright rufo-fulvous.

*Hab.* Celebes (Tondano).

4. *XYLOCOPA PERFORATOR*. *X.* nitida nigra; alis nigro-fuscis violaceo splendide micantibus (*fœmina*). Thorace antice pube cinerea tecto; tarsis anterioribus dilatatis (*mas*).

*Female.* Length 14 lines. Black, and slightly shining; the face with scattered punctures; the thorax finely punctured anteriorly, and with a longitudinally impressed line which terminates at the middle of the disk; the wings dark brown, with a splendid violet iridescence;

the legs with black pubescence. Abdomen broad, depressed, finely punctured, its margins fringed with black pubescence.

*Male.* Length 12 lines. Like the female, with the following differences : the eyes very large, nearly touching on the vertex ; the clypeus triangular, the anterior margin fringed with short pale pubescence ; the thorax clothed in front with short cinereous pubescence ; the anterior tarsi dilated, fringed with black pubescence behind ; beneath it is nearly white ; the wings narrow, pointed at their apex equally brilliant as those of the female ; the posterior femora curved, and, as well as the tarsi, fringed with black pubescence.

*Hab.* Ternate.

This species is very distinct from *X. latipes* ; the scape of the antennæ is perfectly cylindric ; the anterior tarsi are not so broadly dilated, are clothed above with short black hair, and with long hair of the same colour at their margins ; the clypeus entirely black. It is also quite distinct from the *X. Latreillii* of St. Fargeau.

#### Gen. ANTHOPHORA, *Latr.*

1. *Anthophora zonata*, *Linn. Syst. Nat.* i. 955.

*Hab.* Gilolo ; Bachian ; Dory ; Celebes ; Aru ; Borneo ; Ceylon ; India ; Java ; Hong Kong ; Shanghai ; Philippine Islands.

2. *Anthophora vigilans*, *Smith, Supp. Journ. Proc. Linn. Soc.* p. 92.

*Hab.* Makassar ; Menado ; Celebes.

#### Gen. APIS, *Auct.*

1. *Apis socialis*, *Latr. Voy. Humb. & Bonap.* i. 288. 8. tab. 19. fig. 9.

*Hab.* Bengal ; Java ; Malabar ; Ternate.

#### Fam. ICHNEUMONIDÆ, *Leach.*

##### Gen. ICHNEUMON, *Linn.*

1. *ICHNEUMON PALLIDIPECTUS*. *I. ferrugineus* ; capite thoraceque flavo-variegatis, mesothorace et capitis vertice nigris ; abdominis apice albo, segmento 5 nigro.

Length 6 lines. Ferruginous ; the head yellow ; a quadrate spot on the vertex and head behind black ; the antennæ with four or five of the middle joints white above, the terminal joints fulvous beneath. Thorax : the mesothorax black above, beneath pale testaceous ; the anterior and intermediate coxæ and trochanters, a large spot beneath the wings, the posterior margin of the prothorax, the tegulæ and scutellum, yellow ; the wings hyaline ; the apical joints of the tarsi fuscous. Abdomen shining, the two apical segments white, the fifth black.

*Hab.* Celebes (Tondano).

Gen. MESOSTENUS, *Brullé*.

1. **MESOSTENUS DECORATUS.** *M. niger*, capite thoraceque maculis, abdominis fasciis flavo-albidis; pedibus ferrugineis, tarsis posterioribus albis; alis hyalinis.

*Female.* Length 5 lines. Black; the face, mandibles, and orbits of the eyes of a yellowish white; the antennæ with seven or eight joints towards the apex white, the two apical ones black. Thorax: the posterior margin of the prothorax interrupted in the middle; the tegulæ, scutellum, post-scutellum, a spot in the disk of the mesothorax, the sides and apex of the metathorax, yellowish white; the coxæ are of the same colour, with a black line outside the posterior pair; the femora and tibiæ pale ferruginous; the posterior tarsi white, the two anterior pairs dusky. Abdomen: the posterior margin of all the segments white, the apical segment entirely so.

*Hab.* Gilolo.

Gen. CRYPTUS, *Fabr.*

1. **Cryptus sicarius**, *Smith, Proc. Linn. Soc. Supp.* v. 138. 1.

*Hab.* Gilolo; Dory; Bachian.

2. **CRYPTUS FERRUGINEUS.** *C. rufo-ferrugineus*, capite thoraceque nigro-variegatis, abdominis cingulis duabus nigris; alis flavo-hyalinis.

*Female.* Length 8 lines. Rufo-ferruginous; the vertex with a quadrate spot, and the tips of the mandibles black. Thorax: the mesothorax above, its sides, the pectus, and extreme base of the metathorax black; a yellow ovate spot in the middle of the mesothorax; an indistinct fuscous spot on each side of the metathorax above; the wings flavo-hyaline, the nervures ferruginous; the sub-marginal areolet large. Abdomen: the basal margin of the third segment, and a transverse black stripe on the seventh segment towards its base, black.

*Hab.* Celebes (Tondano).

Gen. OPHION, *Fabr.*

1. **Ophion unicolor**, *Smith, Proc. Linn. Soc. Supp.* v. 141. 2.

*Hab.* Gilolo; Bachian.

Gen. RHYSSA, *Grav.*

1. **RHYSSA NOBILITATOR.** *R. capite flavo*, vertice nigro, thorace ferrugineo scabriusculo, scutello flavo; abdomine nigro, segmentis postice rufo-marginatis, primo et secundo, dorso, flavo-maculatis, tertio, quarto et quinto maculis duabus flavis; alis hyalinis, basi flavescente, anticis vitta abbreviata fusca ante apicem ornatis.

*Female.* Length of the body 9 lines, of the ovipositor 13 lines. Head yellow, with the vertex, mandibles and a small ovate spot on the clypeus black; the antennæ ferruginous, slightly fuscous above, with

three or four joints, white about one-third from the apex. Thorax and legs ferruginous; the thorax rugose above; the scutellum, a spot on the metathorax above, the apical portion of the sides, an irregular-shaped mark beneath the wings, and the coxæ in front or with marks on the sides, yellow; wings flavo-hyaline, with a dark fuscous oblong macula crossing the middle of the marginal cell and terminating in a point at the inferior margin of the discoidal cell. Abdomen shining black; a bell-shaped mark in the middle of the first and second segments, and a large subovate spot on each side of the three following, with a narrow line at the sides of the sixth, yellow; the ovipositor black, its sheaths ferruginous.

The male is ferruginous, with the head yellow, the vertex black; the thorax roughly striated transversely; the metathorax above and the abdomen smooth and shining; the wings as in the female.

*Hab.* Celebes (Tondano).

#### Gen. *XYLONOMUS*, *Grav.*

1. *XYLONOMUS FLAVIFRONS*. *X.* capite thoraceque nigris flavo variegatis, pedibus abdomineque ferrugineis, alis hyalinis iridescentibus.

*Female.* Length 6 lines, of the ovipositor 6 lines. Head and thorax black; the face, cheeks, and orbits of the eyes yellow; the antennæ black, with the base of the flagellum beneath fulvous. The posterior margin of the prothorax, a line over the tegulæ, a quadrate spot on the disk of the mesothorax, the scutellum, and metathorax yellow; the disk of the mesothorax transversely striated; a spot beneath the wings and the coxæ yellow; the femora and tibiæ splashed with yellow; the wings hyaline and iridescent. The abdomen smooth and shining, ferruginous, with the margins of the segments of a darker hue; the ovipositor black, its valves ferruginous.

*Hab.* Gilolo.

#### Gen. *EPIXORIDES*.

Head subglobose, antennæ slender and elongate; thorax oblong subcylindric; scutellum flat and quadrate; the anterior wings with one elongate marginal cell pointed at the base and apex; the apical submarginal cell-transverse at the base; the apical nervure of the discoidal cell subangular, with an abbreviated nervure emanating from the point of the angle. Abdomen petiolated; the legs slender and elongate.

This fine species does not appear to belong, strictly, to either the genus *Xorides* or *Xylonomus*, but rather to form a new genus intermediate between them; the neuration of the wings is very like that of the genera above-mentioned: a reference to the figure will show the difference.

1. *EPIXORIDES CHALYBEATOR*. *E.* nigro-chalybeus, fronte facieque subchalybeis, genis verticeque rufescentibus; alis subviolaceis, stigmatate parvulo pallido, metathorace quadricarinato; pedibus anticis rufescentibus, intermediis et posticis nigro-violaceis.

*Male.* Length 11 lines. Head ferruginous, with the face chalybeous;

the thorax, coxæ, and abdomen bright chalybeous, the tibiæ and tarsi nigro-chalybeous; the thorax transversely rugose; the metathorax with four longitudinal carinæ, the intermediate pair closely approximating, the whole transversely rugose; the apex of the metathorax with a short tooth or spine on each side of the insertion of the abdomen. Abdomen petiolated, the three basal segments with several oblique and curved depressions.

*Hab.* Ceram.

Fam. BRACONIDÆ, *Westw.*

Gen. BRACON, *Fabr.*

1. *Bracon jaculatus*, *Smith, Proc. Linn. Soc. v. p. 141.* 2.

*Hab.* Ceram; Bachian.

2. *BRACON INGENS.* *B. niger*, capite, thorace subtus pedibusque anticis et intermediis ferrugineis; alis nigris, maculis hyalinis.

*Female.* Length 11 lines; ovipositor 37 lines. Black; the head ferruginous, with the region of the ocelli, the tips of the mandibles, and the antennæ black; a few black hairs scattered over the face and on the scape in front. Thorax smooth and shining, ferruginous beneath, as well as the anterior and intermediate legs; the metathorax with a thin, erect, black pubescence; wings dark-fuscous, with a yellow subhyaline spot in the first submarginal cell, and a smaller clear hyaline one beneath it; the posterior wings have also a subhyaline yellow spot in the middle of their anterior margin. Abdomen: the three basal segments rugose, the following smooth and shining; the three basal segments and the posterior legs with black pubescence.

*Hab.* Celebes (Tondano).

3. *BRACON (MYOSOMA) PENETRANS.* *B. flavo-rufus*, vertice macula notato et antennis nigris; alis flavo-hyalinis, dimidio apicali fusco.

*Female.* Length 5 lines. Reddish yellow, the antennæ and vertex black; the body and legs thickly covered with pale-fulvous pubescence; the face yellow; the thorax shining above; the basal half of the wings yellow, the apical half dark brown, with a narrow hyaline spot running beyond and crossing the marginal cell; the second transverse cubital nervure with a narrow hyaline border. Abdomen: the first segment vertical, forming an angle with the rest of the abdomen; the second segment with a tubercle in the centre of its basal margin, a smaller one at each lateral angle; from the central tubercle a deeply impressed oblique line runs to the side of the segment about the middle; the angle thus formed on each side is smooth and shining; the other portion of the segment is rugose; the following segments are smooth, shining and pubescent.

*Hab.* Ceram.

Genus AGATHIS, *Latr.*

1. *Agathis sculpturalis*, *Smith, Proc. Linn. Soc. iii. 25.* 1.

*Hab.* Gilolo; Makassar.

2. *AGATHIS STRIATA*. *A. flavo-rufa*, antennis nigris, abdomine nitido, longitudinaliter striato; alis flavo-hyalinis, dimidio apicali fusco.  
*Female*. Length 7 lines. Reddish yellow; the head triangular; the face pale; the antennæ black, with the scape yellow; the basal joints of the flagellum obscurely fulvous beneath; thorax smooth and shining; the basal half of the wings yellow hyaline, the apical half dark brown, with a minute hyaline spot below the stigma in the middle of the wing. Abdomen: the three basal segments and the base of the fourth evenly striated longitudinally.

*Hab.* Gilolo.

Gen. *CENOCÆLIUS*, *Haliday*.

1. *Cenocælius cephalotes*, *Smith*, *Proc. Linn. Soc.* v. 65. 1.

*Hab.* Gilolo; Celebes.

Fam. *TENTHREDINIDÆ*, *Leach*.

Gen. *CLADOMACRA*, *Smith*.

1. *Cladomacra macropus*, *Smith*, *Ann. & Mag. Nat. Hist.* 1860, vi. 257.

*Hab.* Celebes (Tondano).

#### ERRATA.

Several changes in the numbering of the objects that illustrate this paper having been made since the first sheet was printed, the following corrections of the references must be attended to. The numbers refer to figures of the scale of the abdomen of the different species.

Figs. 6 and 7, *Polyrhachis Orsyllus*.

Figs. 12 and 12a, *P. Diaphantus*.

Figs. 15 and 20, *P. Mutilæ*.

Fig. 16, *P. exasperatus*.

Fig. 21, *P. Hippomanes*.

Fig. 23, *P. Lycidas*.

Fig. 24, *P. Eurytus*.

Fig. 25, *P. Numeria*.

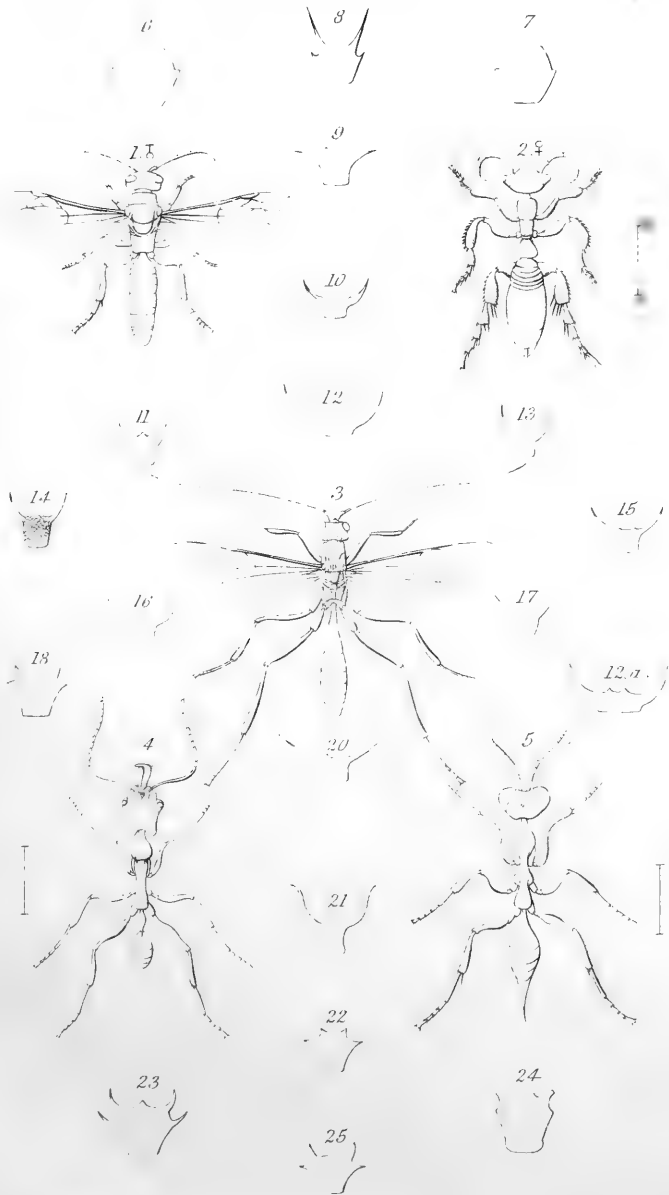
On the Cranial Characters of the Snake-Rat, new to the British Fauna. By S. JAMES A. SALTER, M.B., F.L.S., F.G.S.

[Read April 7th, 1859.]

THE Society will doubtless recollect that last year\* I exhibited at one of our meetings two living rats, one of which I believed to be new to the British Fauna—at least, new so far as that till then it had been unrecognized and undescribed as distinct. The other was a specimen of the old English Black Rat (*Mus rattus*); and this was shown, not on its own account, but for contrast and comparison. And I selected the Black Rat for this comparison because it so much more closely resembles the new one than does the

\* May 6th, 1858.



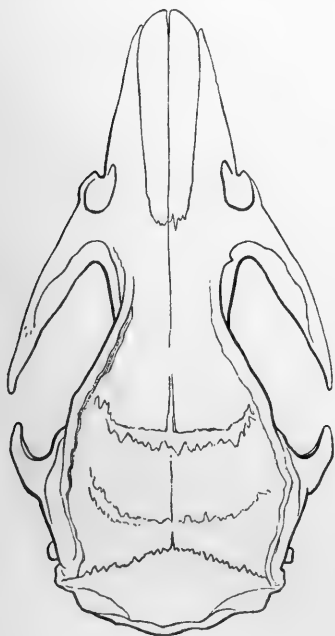




Brown Rat (*Mus decumanus*), which is quite different. If therefore the new rat is a mere variety of either of the two species which have been long known as members of the British mammalian fauna, and which have always been considered specifically distinct, it must be deemed a variety of *Mus rattus*; but I claim for it distinctive characters separating it from that rat, quite as marked as those which distinguish the Brown from the old English Black Rat. Indeed *Mus decumanus* more nearly resembles *Mus rattus* than does the new rat. It was suggested to me, at the time I exhibited the living specimens, that an appeal must be made to the cranial characters of each, before the distinctness and the degree of distinctness between the two could be established. The result of this investigation I now give to the Society.

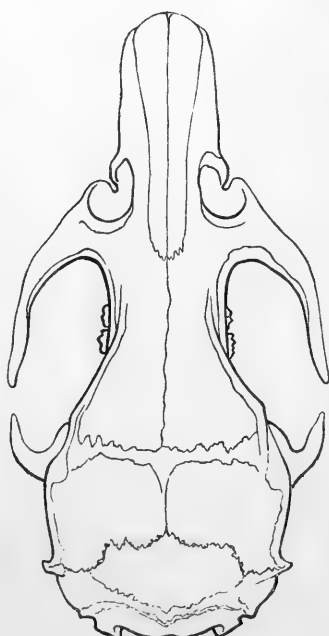
On the table are the skulls of the identical rats that were formerly exhibited—two adult males; and I have also some enlarged outline drawings (from which the accompanying woodcuts were taken) showing the salient peculiarities of each cranium. The

Fig. 1.



Top view of Cranium of Snake-Rat.  
Enlarged two diameters.

Fig. 2.



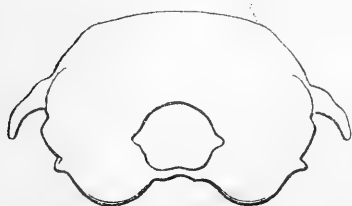
Top view of Cranium of *Mus rattus*.  
Enlarged two diameters.

distinctive differences are considerable and many: some of the principal I will enumerate. By reference to the accompanying figures they will be easily recognized; and the drawings have been rendered twice life-size to make the distinctions more conspicuous. The proportions have been retained with scrupulous care\*.

Commencing with a top view of the skull, the *nasal bone* is seen in *Mus rattus* to be broad and obtuse at its anterior extremity, bulging out somewhat suddenly; whereas in the other skull it is more pointed, and it increases from behind forwards by an even line. In *Mus rattus* the *infra-orbital foramina* are nearly twice as large as those in the other skull, while the interval between these foramina is barely more than half, showing a much larger nasal capacity in the new rat. In the latter the *zygomatic arches* are nearly straight; in the former they are much bowed. The *fronto-parietal suture* is crescentic in the new rat; it is nearly straight in *Mus rattus*. In the former there is a strongly marked crescentic ridge for muscular attachment passing across the parietal bones; this is totally wanting in the latter. The *lambdoidal suture* in the new rat is truly lambdoidal; in the other it is an irregular wavy line passing across the skull. In this view of the cranium the molar teeth are visible in *Mus rattus*, whereas they are hidden in the other skull.

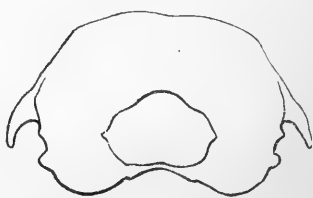
But the most important and weighty distinction between the two skulls is the size and form of the *foramen magnum occipitale*, as seen on the posterior view of the cranium. In the new rat the foramen is nearly circular, with two small lateral notches, and comparatively small; in the old Black Rat it is oval, with a central curved notch above, broad from side to side, and very large.

Fig. 3.



Posterior view of Cranium of  
the Snake-Rat. Enlarged  
two diameters.

Fig. 4.

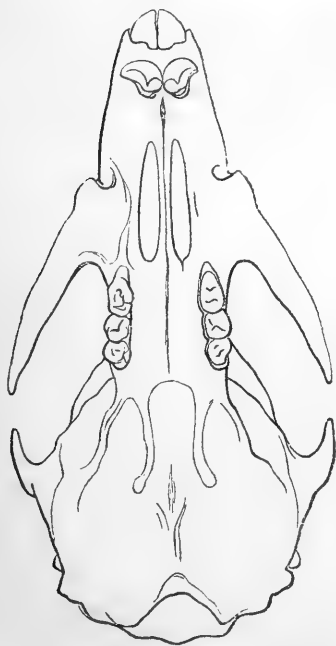


Posterior view of Cranium of  
*Mus rattus*. Enlarged two  
diameters.

\* I am indebted to my brother, Dr. Hyde Salter, F.R.S., for these accurate drawings.

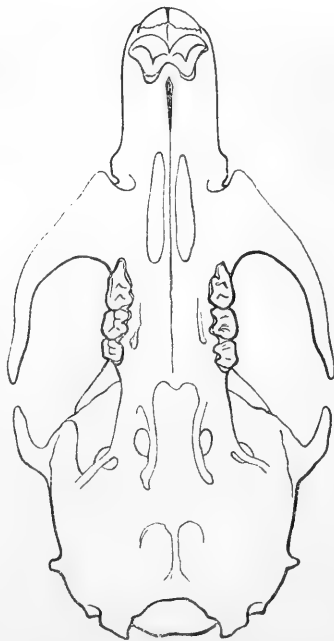
The circumstance which gives especial weight to this difference in the occipital foramina of the two skulls is that it involves a corresponding difference in the large nervous centre (the medulla oblongata) which occupies the foramen. I conceive that osteal characters or forms associated with corresponding modifications of any portion of the nervous system are of first-class importance. This would especially apply, in the case I am considering, to the *foramen magnum occipitale*: the same principle would hold good, in a minor degree, as to the differences already mentioned in the infra-orbital foramina, which transmit the nerves distributed to the tactile organs about the mouth.

Fig. 5.



Under view of Cranium of Snake-Rat, minus the lower jaw. Enlarged two diameters.

Fig. 6.



Under view of Cranium of *Mus rattus*, minus the lower jaw. Enlarged two diameters

On the under surface of the skulls there are further distinctive differences. In the new rat the *foramen ovale* is hid by the lateral spreading of the pterygoid processes of the sphenoid bone; in the Black Rat it is exposed. The breadth of the palate, the size of

the posterior nares, the position of the incisor teeth are all different; but these characters and other minor ones will be better appreciated by referring to the specimens themselves and the illustrations.

I have not thought it worth while to figure or describe comparatively the skull of *Mus decumanus*. I may mention, however, that it is very distinct from that of the new rat; indeed it is more like the skull of *Mus rattus*. The common Brown Rat's skull is rather longer and slenderer than either of the others; it is narrower across the cerebral region, and does not there bulge out in so rounded a form, but is more oblong. The two ridges which pass backwards from the frontal bone, at the top of the zygomatic fossæ, scarcely extend to the parietal bones in the new rat; in *Mus rattus* they diverge and bow out in a crescentic form over the parietal bones, whereas in *Mus decumanus* they pass back sharp, rigid and parallel. The foramen magnum occipitale is even more extended laterally than in *Mus rattus*: it is not so deep vertically, and has not the crescentic notch in the centre of its upper outline. In the skull of *Mus decumanus* there is a little process projecting backwards from the front angle of the zygomatic fossæ; I have found it in every skull of the Brown Rat I have examined: it does not exist in either of the others.

Blasius, in his 'Fauna of the Mammalia of Central Europe,' gives an admirable figure of the skull of *Mus decumanus* (fig. 171, page 310): it is critically correct, and has all the distinctive characters which mark the cranium of this rat.\*

I am fully aware that too much importance should not be attached to observations made on single specimens; and I am aware, too, that allowance should be made for the possibilities of individual variety. I regret that I have been unable to multiply my specimens; but it is difficult to obtain many, either of the Black Rat or the Snake-Rat. I have reason, however, to think that the different kinds of rats are not liable among themselves to any very marked *individual* varieties in the anatomical characters of their crania. I have had opportunities of examining enormous numbers of the common Brown Rat's skull. The crania have been all exactly alike: Blasius's figure might have been copied from any one of them. Again, the differences between the two skulls I have contrasted are of such importance, and so grave, that they seem inconsistent with mere variety: indeed I am not aware that

\* Fauna der Wirbelthiere Deutschlands &c., Naturgeschichte der Säugethiere, von J. H. Blasius. 1857.

any animals, not domesticated, are *ever* liable to such individual differences in the most important osteological characters as these skulls have exhibited.

Whether this rat has long been an inhabitant of this country—whence imported, if imported (which I think most likely)—are questions that I cannot at present answer. The rat corresponds very closely with the *Mus Alexandrinus* of Geoffroy St.-Hilaire, and will very probably turn out to be the same. It has been known for many years to those who trade in rats for sporting purposes, but has probably been hitherto confounded by scientific men with the old Black Rat of this country.

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*Note.*—Since the foregoing was written, I have had reason to conclude that the Snake-Rat is certainly the same species, race, or variety as was first described by Geoffroy St. Hilaire under the name "*Mus Alexandrinus*." But at the same time my further investigations into this subject have convinced me that our knowledge of the rats of Great Britain, or of rats in general, is not so satisfactory or definite as descriptions in works on Natural History would lead us to suppose. Undoubtedly, characteristic specimens of *M. rattus*, *M. decumanus* and *M. Alexandrinus* may be obtained; but there are intermediate forms in endless variety, as any one may satisfy himself by an inspection of the cages of a rat-catcher after his visit to the rat-homes about the docks of London. There can be no question that the typical forms enumerated above as three species are constantly being merged and reduced, under favouring conditions, by interbreeding: the most superficial observation of many specimens will convince any one of this fact. This circumstance was demonstrated some years since at the Zoological Gardens, Regent's Park. Some individuals of *Mus Alexandrinus*, which had been sent from Alexandria, got loose in the gardens; and for a long time afterwards the keepers frequently caught cross-bred rats, at first half-breds, and afterwards with less and less of the character of the Snake-Rat, till at length all traces of it disappeared. In the language of horse-breeders, the new "strain of blood" was "bred out" or eliminated, or, more correctly, it was overpowered by the repeated crossing always on the line of the common Brown Rat. Had the circumstance been reversed and a few of the *Mus decumanus* had escaped among a multitude of *M. Alexandrinus*, the characters of the latter would have undoubtedly prevailed in the end. The capacity for interbreeding appears to be endless and indefinite.

There are sorts of rats which will not come within the category of those recognized, or as their intermediate crosses. We have in this country a black rat with a white chest: in the British Museum are two stuffed rats, chestnut-coloured, with white breasts, which were captured in Cambridgeshire. The distinguished Irish naturalist, Mr. William Thompson, has described a black rat with a white chest as a new species, under the name of *Mus Hibernicus*.

On the occasion of the reading of my paper on the cranium of the Snake-Rat, it was suggested by Mr. Lubbock that it might be a "variety" of one of our other rats. Subsequently, in a discussion in the 'Field' newspaper\*, by which a great deal of interesting information respecting rats was brought out, Mr. Newman put forward the idea that these cosmopolitan rodents are, in their differences, not so many species, but mere "*geographical races*;" and I am much inclined to believe that this is the truth of the matter. Certainly if interbreeding and a resultant fertile offspring determine the specific identity of varying individuals, there is an end of the question. The different rats *do* interbreed and their progeny *are* fruitful for any length of time and any number of generations.

Rats hold a curious intermediate position between wild and domestic animals. They are not absolutely either, and they are both. They are wild as they are their own masters and roam at will: they approach a domestic condition inasmuch as they are nearly always associated with man and are indirectly dependent on him for their food. Rats are cosmopolitan—they inhabit almost if not quite every region where the human race dwells. In violation, or at least not in keeping with their dentition and organs of primary assimilation, rats are omnivorous: they can live entirely on animal food—they even resort to the predaceous habits of carnivora; or they may have the barest vegetable diet for their sole sustenance. Such constitutional capabilities and such adaptability of habit afford wonderful conditions for the development of races.

*Mus Alexandrinus* appears to be spreading all over the world; its extreme agility and the ready way in which it accommodates itself to ship-board naturally tend to such a result.

Besides the Eastern localities where it was first found, according to Blasius it was observed by Savi in Italy in 1825, and named by him *Mus tectorum*; it was found by Pictet near Geneva in 1841, and described by him under the title of *Mus leucogaster*;

\* For September 8th and 15th, 1860.



Blasius states that he himself saw it at Antibes in the south of France, and he repeatedly obtained it from the Alps in south-eastern France. It has also been taken at Stuttgart; and Rüppell mentions that it has been sent to him from America. In this country it has long been known to rat-catchers in the neighbourhood of the docks both in London and Liverpool.

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Contributions to an Insect Fauna of the Amazon Valley.—*Lepidoptera*:—*Heliconinæ*. By H. W. BATES, Esq. Communicated by GEORGE BUSK, Esq., Sec. L.S.

ABSTRACT.

[Read Nov. 21st, 1861.]

THE author, who founds his memoir on personal observations made on the banks of the Amazon, commenced by defining the limits of the group. It comprises a number of strangely formed butterflies peculiar to tropical America. Its relations to the allied groups, *Danainæ*, *Acræinæ*, and true *Nymphalinaæ*, are of a peculiar nature, as it contains two essentially distinct types of form, the one having an affinity with the *Danainæ*, the other with the *Acræinæ*, or with the *Argynnide* group of *Nymphalinaæ*. As, however, all authors have combined them into a district family, and they are homogeneous in external aspect, they will be treated as sections only of the sub-family, viz. Danoid and Acræoid *Heliconinæ*, instead of referring them, one to the *Danainæ*, and the other to the *Acræinæ*, and thus sinking the group *Heliconinæ*. This view of their affinities throws great light on the affiliation of the forms—an object to which all efforts in systematic zoology obscurely tend. The *Danainæ* and *Acræinæ* are common to the hot zones of both hemispheres; and the *Heliconinæ* being the highest development of the common type, it results that the latter reaches its highest development in the tropics of the new world. The species are most numerous where the forests are most extensive and humid. They are characteristic of their region, and, like the Platyrrhine monkeys, the arboreal Gallinacea (*Penelopidæ* and *Cra-cidæ*), and other groups, point to the gradual adaptation, during an immense lapse of time, of the fauna to a forest-clad country. Two hundred and eighty-four species have already been described; but every collection made in a newly explored part yields several new ones. In some of the genera they are confined to very limited areas, the species being found to change in the uniform country of the Upper Amazon from one locality to another not further re-

moved than one hundred to two hundred miles. Such species, however, have often the character of local varieties, some of them indeed showing the connecting links. From facts observed, it would seem that the excessive multiplication together with the distinctness of the species were owing to their great susceptibility of modification, combined with the habit in pairing of selecting none but their exact counterparts, and probably other causes tending to eliminate the intermediate gradations. The species are mostly extremely numerous in individuals, and show every sign of flourishing existence, although they are of feeble structure, and fly slowly in exposed situations frequented by swarms of insectivorous animals. They are gregarious in habits, the individuals of the same species and clusters of closely allied species being found in company restricted to limited spots in the forest. They are often seen in pairs or small parties, apparently engaged in a kind of dance. The large handsome species are so numerous in some places that they form part of the physiognomy of the localities. The only secondary sexual characters are tufts of hairs on the fore margin of the hind wing in the males of most of the *Acraeoid* group. These appear to be of no particular utility, but are apparently analogous to the pencil of hairs on the breast of the male turkey. The allied group, *Danainæ*, afford a similar feature, the males having a horny excrescence on the *disk* of the hind wing, which is evidently homologous with the structure above described. The most interesting part of the natural history of the *Heliconinæ* is the mimetic analogies of which they seem to be the objects. This involves questions of the highest scientific interest. Many of the species are mimicked by members of widely distant groups, *e. g.* *Papilio* and *Leptalis* (*Papilionidæ*), *Ithomeis* (*Erycinidæ*), *Castnia* (*Castniadæ*), *Diopis*, *Pericopis*, *Hyelosia*, &c. (*Bombycidæ* moths). It is fair to conclude that they are the objects imitated, because they all have the same family facies, whilst the analogous species are dissimilar to their nearest allies—perverted, as it were, from the normal facies of their genera or families. The mimicking species are found in company with the *Heliconinæ*; and it often happens, where these latter are modified into local varieties, species or local varieties of the former in an analogous dress also occur with them. A parallel series of imitations occurs in the old-world tropics, where it is the representatives of the *Heliconinæ* that are the objects imitated. The instance of this kind of analogy most familiar to European entomologists is that of the species of *Trochilium* (a genus of moths),

which mimic strangely various bees, wasps, and other Hymenopterous and Dipterous insects. The *Heliconinæ*, however, mimic each other to a great extent—the parallel species belonging to quite distinct genera. In this case also, when the species present local varieties, the analogues are modified in precisely the same way, so that two or three species belonging to different genera resemble each other so much that they can scarcely be distinguished except by their generic characters. Endless instances of these imitative resemblances occur in entomology. Why they are so plentiful and amazingly exact in insects, whilst so rare and vague in the higher animals, is perhaps owing to the higher degree of specialization attained by the insect class, which is shown also by the perfection of their adaptive structures and instincts. Their being more striking and numerous in tropical than in temperate countries is perhaps attributable to the more active competitive life and the more rapid succession of the generations in the former than in the latter. The meaning of these analogies is not difficult to surmise. In the first place, they cannot be entirely the result of similarity of habits or external physical conditions necessitating similar external dress. They are of the same nature as the assimilation of an insect or other animal in superficial appearance to the vegetable or inorganic substance on which it lives. The likeness of a beetle or lizard to the bark of the tree on which it crawls cannot be explained as an identical result produced by a common cause acting on the tree and the animal: one is evidently adapted to the other. The infinite variety of resemblances between insects and plants or inorganic substances—between predaceous animals and their victims—the adaptation of organs or functions to the objects or habits they relate to—are all of the same nature. They are adaptations either of the whole outward dress or special parts, all having in view the welfare of the creatures that possess them. Every species in nature may be looked upon as maintaining its existence by virtue of some endowment enabling it to withstand the host of adverse circumstances by which it is surrounded. The means by which the existence of species is maintained are of endless diversity; and amongst them may be reckoned the resemblance of an otherwise defenceless species to another whose flourishing race shows that it possesses peculiar advantages. The *Heliconinæ*, by the great number of their individuals, show themselves to be a favoured family. It is not easy to discover anything in their structure or habits which might give them an advantage. There

is some cause to believe that they are unpalatable to insectivorous animals—at least the *Acræoid* group. This would not explain, however, the numerous mutual resemblances of the *Heliconinæ*. All that we can say is, that some species are more successful in the battle of life than others, and that it is an advantage to others not otherwise provided for if they are brought to be deceptively similar to them. The process by which this is brought about in nature is a problem involved in the wider one of the origin of all species and all adaptations. There are some curious facts, however, in the geographical distribution of the species and varieties of certain members of the genus *Leptalis* which throw great light on the subject, at least as far as the *Leptalides* are concerned, which offer perhaps the most remarkable cases of mimicry. It would appear by these facts that a mimetic species has not always existed under the same specific mimetic dress which it now wears, as the following example shows. *Leptalis Lysinoë* in one district is very variable, but none of its varieties mimics very closely a *Heliconine* species there residing; they rather tend to imitate species of *Stalactis*—another flourishing group belonging to a different family; but a few individuals occur intermediate in character, and quite uncertain in their analogies. In another district, again, this species is very variable, and some of the varieties are indeterminate in their analogies, but the greater number resemble to deception one or other of three species of *Ithomia*, amongst which only they are found, and from which they are quite undistinguishable, except when closely examined in the hand. In a third locality this *Leptalis* is found under one form only, distinct from any of the varieties occurring elsewhere, but mimicking closely an *Ithomia* also found there and not in the other two districts. Thus we see that, although the changes a species undergoes, first simply variable, and then presenting local varieties closely mimicking other forms, cannot be watched in nature as they take place successively, they can be seen as it were simultaneously by tracing them over the area of its distribution. *Leptalis Lysinoë* is a species of great rarity, and therefore liable to complete extinction. It seems fair to conclude that, as the *Ithomiæ* which it mimics are certainly spared by the swarms of insectivorous birds which daily sweep through their abodes, the *Leptalis*, not being so favoured, escapes destruction by wearing the livery of the *Ithomiæ*. It may be added that the family to which *Leptalis* belongs (*Pieridæ*) are certainly much persecuted by insectivorous animals. As, then, the *Leptalis* varies from one locality to another, some few of its varia-

tions being of uncertain character, it seems evident that when the mimicry is complete the indeterminate and intermediate grades of variation have been eliminated by insectivorous animals. The *Leptalides* have probably been subjected to this untiring persecution, even to the verge of extermination, in each successive generation throughout an immense lapse of time. By living in the vicinity of other species free from the same persecution, and being already similar to them in general appearance, this latter being inherited through a long line of ancestors which have been more or less subjected to similar conditions, such of their varieties as nearest resembled the protected species would escape destruction and thus alone propagate their kind. General resemblances between forms may be owing in some cases to similar habits, or to such general causes as have produced what are called recurrent animal forms; this general resemblance must exist before the causes which produce mimetic analogies can come into play. It must be remarked that some of the exact resemblances already alluded to between species of *Heliconinae* seem not to be owing to the adaptation of one to the other, but rather (as they have a real affinity, the genera to which they belong being throughout very similar in colours and all equally flourishing) to the similar adaptation of all to the same external local conditions. The check which acts by destroying the indeterminate variations in these cases would not be the same as in *Leptalis*; in other respects, however, the same law of nature appears, namely, the selection of one or more distinct varieties by the elimination of intermediate gradations. It may be remarked also that a mimetic species need not always be a rare one, although that is very generally the case: it may be prolific, or its persecution may be intermitted when the disguise is complete. The operation of checks successively eliminating variations unfavourable to a species, as thus explained, produces the impression of a stimulus impelling an advance of organization in a special direction. This apparent direct advance suggests the only other scientific explanation that could be suggested, viz. the operation of volition or an innate tendency in the creatures themselves to become gradually assimilated to other forms, and thus acquire a disguise favourable to the species. On examination, however, this explanation is found to be untenable, and the appearances which suggest it illusory. Those who earnestly desire a rational explanation must arrive at the conclusion that these apparently miraculous but always beautiful and wonderful mimetic resemblances, like every other kind of adaptation in beings, are brought about by causes similar to those here discussed.

Note on the Occurrence of the Crustacean *Scyllarus Arctus* in England. By JONATHAN COUCH, Esq., F.L.S.

[Read Dec. 5, 1861.]

THE *Scyllarus Arctus* has been of too rare occurrence in Britain to have acquired an English name; and, indeed, it appears uncertain whether hitherto its existence on our shores has ever been placed beyond a doubt. It has been said that one example, and perhaps two, have been found in Mount's Bay, in Cornwall; but as the same authority reports it to have its residence in shallow water, where it lives in a burrow formed by itself, and we have proof that it has been carefully sought for in vain in the district referred to, there seems to have been some reason hitherto for retaining a distrust of the evidence which could only rest on the supposed occurrence of examples twice in the space of a hundred years. This difficulty, however, can no longer be felt; and I have the satisfaction of reporting to the Linnean Society the occurrence of a specimen, which was obtained at a distance of about a couple of leagues from this place (Polperro). The discovery itself is due to the diligence of Mr. William Laughrin, A.L.S., whose practice of examining the stomachs of fishes has been long continued, and for scarce specimens of Crustaceans highly successful; but it was only at the beginning of this present November (1861) that he was so fortunate as to find the Crustacean here mentioned. It was in the stomach of a Cod, which was taken with a line by a fisherman of Polperro, at the depth of about forty fathoms; and from this depth of water we learn that this Crustacean is not so entirely, if at all, an inhabitant near the shore and in shallow water, as has been supposed. This example of a rare Crustacean had suffered very slightly from the digestive action of the stomach; and in its prison it had for its companions two specimens of *Alpheus ruber*—a species which appears to exist in considerable numbers on the ground frequented by the codfish at the depth above specified.

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On a New Genus of *Tunicata* occurring on one of the Bellona Reefs. By JOHN DENIS MACDONALD, R.N., F.R.S., Surgeon of H.M.S. 'Icarus.' (Communicated by the Secretary.)

[Read Dec. 5, 1861.]

AMONGST many interesting objects of natural history obtained by H.M.S. 'Herald' during her visit to the Bellona Reefs (lat. 21°

51' S., long. 159° 28' E.) was a very remarkable Ascidian, which, as it appears to be quite new, merits brief notice.

The external appearance of the animal so much resembled the nidamental case of some large Gasteropod, affixed to a block of coral, that no suspicion of its real nature was entertained until it had been minutely examined. Soon, however, it was ascertained that within a thin coriaceous test, fashioned like a snuff-box, with a perfectly applied lid, a little tunicary was enclosed, enjoying the power of opening and closing the operculum or door of its retreat at will.

The case (figs. 1 & 2) was about  $\frac{1}{2}$  an inch in length, and over  $\frac{3}{5}$  of an inch in breadth, though rather fuller in front than behind. The attached side was flat (fig. 2), but the free surface (equivalent to the right side of the recumbent animal) was convex and rounded (*d*); so that the aperture at the anterior end presented a D-shaped or semicircular figure (fig. 4); and this was accurately fitted with a lid of a corresponding shape. The free margin of both the aperture and the lid was beset with minute and rigid spines, having an inward curvature protecting the entrance from invasion. In continuity with these margins a thin layer of test-substance was traceable as a kind of conjunctiva (fig. 4 *c*), upon the anterior part of the contained animal, to the borders of the branchial (*d*) and cloacal openings (*e*), which occupied the same plane in the mouth of the cell, being merely divided by a narrow transverse depression. Both these openings were simple though somewhat puckered in the contracted state, and encircled at a little distance from the free edge by a broad band of pale-red pigment.

The mantle was closely applied to the inner surface of the test, without, however, giving off any palliovascular processes. A dark-coloured reticulation, visible through the outer epithelium, marked off the distribution of the blood-vessels; and the disposition of the internal organs was traceable through the semitransparent tissues (fig. 3).

Not wishing to destroy the specimen, I did not determine the arrangement of its respiratory membrane; but I observed that the branchial orifice was guarded by a circle of simple tentacula (fig. 4 *d*).

The œsophagus was short, soon opening into a subglobular stomach with thick glandular walls thrown into longitudinal folds. The intestine proceeded from the posterior end of the stomach, around which it turned inferiorly, and having coursed forwards to within a short distance of the cloacal opening, it ended in the vent.

Fig. 1.

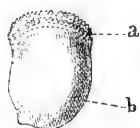


Fig. 2.



Fig. 3.

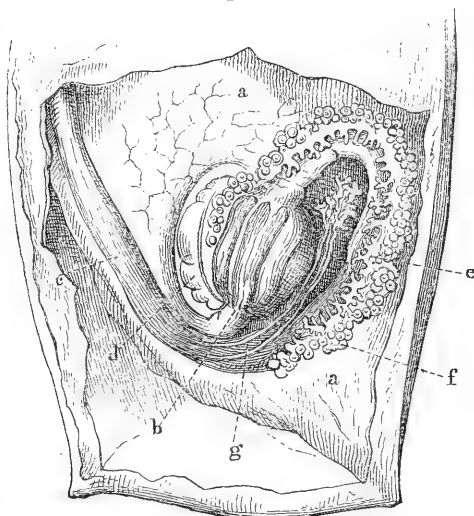
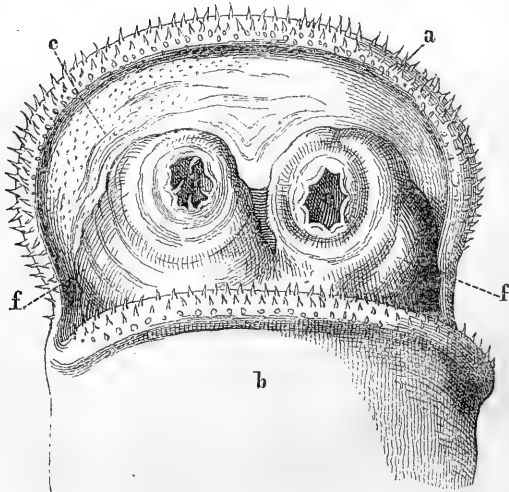


Fig. 4.





The heart (fig. 3 *d*) lay in front of the stomach, extending into the interval between that organ and the œsophagus.

The follicles of the testicle skirted the convexity of the intestinal curve, and immediately superficial to these were the sacculi of the ovarium. The ducts, however, converged from the hollow of the intestinal loop, and led forwards beside the rectum (fig. 3 *c*).

*Perophora* is a pouch-bearer; but the present genus, being a little pouch in itself, may be called *Pera*; and the species *Huxleyi*, after one who, above all English observers, has added most to our precise knowledge of the *Tunicata*.

The original specimen from which this imperfect description was taken is now in the possession of Professor Huxley; and I may mention, in conclusion, that Professor Claparède suggested to me the existence of a similar operculate condition of the test in the case of the so-called house of *Appendicularia*, in which, however, I believe each aperture is furnished with a distinct valve.

#### REFERENCES TO THE FIGURES.

Fig. 1. Front view of the animal with the lid closed.

Fig. 2. Side view of ditto (nat. size).

Fig. 3. Posterior view magnified, with a portion of the test removed to show the internal organs.

„ *a*. Mantle detached from the test below.

„ *b*. Stomach.

„ *c*. Intestine.

„ *d*. Heart.

„ *e*. Testicular follicles.

„ *f*. Ovarium.

„ *g*. Ducts.

Fig. 4. Front view magnified, with the operculum thrown open.

„ *a*. Operculum.

„ *b*. Body of the cell.

„ *c*. Conjunctive membrane.

„ *d*. Branchial orifice with tentacula appearing.

„ *e*. Cloacal orifice.

„ *f*. Oclusor muscular fibres.

Catalogue of the Heterocerous Lepidopterous Insects collected at Sarawak, in Borneo, by Mr. A. R. WALLACE, with Descriptions of New Species. By FRANCIS WALKER, Esq., F.L.S.

[Read April 4, 1861.]

Fam. *ÆGERIIDÆ*, *Steph.*

Gen. *ÆGERIA*, *Fabr.*

1. *ÆGERIA CHALYBEA*, n. s. *Mas.* Chalybeo-cyanea, pectore et segmentorum abdominalium marginibus posticis argenteis, pedibus pallide aurato tomentosis, alis limpidis, costa venis fimbriaque purpureis. *Male.* Chalybeous blue. Pectus and sides of the thorax silvery. Abdominal segments with silvery hind borders. Legs with pale gilded tomentum. Wings limpid; costa, fringe, and veins cupreous purple. Length of the body 5 lines; of the wings 10 lines.

The specimen of this species is injured, and therefore it is not fully described.

Gen. *SANNINA*, *Walk.*

2. *SANNINA PULCHRIPENNIS*, n. s. *Mas.* Cyanea, robusta, viridi purpureoque varia, oculis argenteo marginatis, thoracis humeris albo squamosis, calcaribus albis, alis anticis cyaneis, posticis lurido-hyalinis cyaneo marginatis.

*Male.* Metallic blue, stout, varied with green and purple. Head silvery white about the eyes. Palpi almost vertical, not rising higher than the head. Thorax with smooth closely-applied scales; a tuft of white scales on each in front. Abdomen nearly linear; apical tuft rather long. Legs stout, squamous; spurs white. Fore wings bright metallic blue, tinged with purple; costa slightly dilated towards the tip; fringe cupreous purple like that of the hind wings. Hind wings vitreous, with a lurid tinge, bordered with metallic blue; costa irregularly and veins purplish blue. Length of the body 8 lines; of the wings 15 lines.

3. *SANNINA RUFIFINIS*, n. s. *Mas.* Cupreo-purpurea, capite argenteo, humeris albo squamosis, abdomine lateribus basi albo fasciculatis, dimidio apicali rufo, tibiis posticis nigro subfimbriatis, calcaribus albis, alis anticis viridibus apices versus purpureis, posticis lurido-vitreis.

*Male.* Cupreous purple, in structure like the preceding species. Head silvery white in front and about the eyes. Thorax with a tuft of white scales on each side in front. Abdomen with a tuft of white hairs on each side at the base; apical half and apical tuft bright red. Legs stout, squamous; tibiæ slightly fringed with black hairs; spurs white. Fore wings metallic green, purple towards the tips; costa

slightly dilated towards the tip. Hind wings vitreous, with a lurid tinge; costa irregularly, veins and fringe purple. Length of the body 8 lines; of the wings 15 lines.

Gen. MELITTIA, *Hübner*.

4. MELITTIA FASCIATA, n. s. *Fæm.* Metallico-nigra, crassa, capite subtus fasciculato, abdomine fascia lata rufa, tibiis posticis nigro late fasciculatis basi albido pilosis, alis anticis nigris apices versus pallidis subaurato tomentosis, posticis limpidis, costa venaque 1<sup>a</sup> inferiore nigro marginatis.

*Female.* Metallic black, very robust. Head with a thick tuft at the base of the palpi. Palpi hardly ascending higher than the vertex; 3rd joint lanceolate, about one-third of the length of the second. Antennæ hardly thicker exteriorly. Abdomen with a broad red band, which is mostly before the middle. Legs stout; hind tibiæ with whitish hairs at the base; the rest broadly fringed with black hairs. Fore wings black, narrow, slightly broader towards the tips; apical part pale, with slightly gilded tomentum. Hind wings limpid, blackish along the costa and along the 1st inferior vein. Length of the body 12 lines; of the wings 24 lines.

Gen. BONIA, n. g.

*Mas.* Corpus gracile. Palpi graciles, arcuati, lanceolati, ascendentes, caput superantes; articulus 3<sup>us</sup> 2<sup>o</sup> non longior. Antennæ dense fimbriatæ. Pedes graciles, fimbriati; femora tibiæque apice late fimbriata. Alæ opacæ, perangustæ.

*Male.* Body slender. Palpi slender, curved, lanceolate, rising high above the head; 3rd joint very acute, as long as the second, and much more slender. Antennæ broadly and thickly fringed, more than half the length of the body. Legs slender; femora, tibiæ, and tarsi fringed; femora and tibiæ broadly fringed towards the tips; hind tibiæ with four long spurs. Wings opaque and very narrow in the typical species.

This genus seems to connect the *Ægeridæ* with the *Tineina*.

5. BONIA UNICOLOR, n. s. *Mas.* Cupreo-purpurea, antennis pedibusque nigro fimbriatis, alis peracutis.

*Male.* Cupreous purple. Antennæ and legs fringed with black hairs. Wings very acute; fringe long. Length of the body 5 lines; of the wings 12 lines.

Gen. TYRICTACA, n. g.

*Fæm.* Corpus squamosum, sat validum. Palpi graciles, ascendentes, lanceolati, subarcuati, caput non superantes; articulus 2<sup>us</sup> 3<sup>o</sup> valde brevior. Antennæ læves. Abdomen longi-conicum. Pedes brevius-

culi, appressi, subdilatati, tibiis posticis densissime fasciculatis. *Alæ* angustæ, non acutæ.

*Female.* Body squamous, rather stout, and convex. Palpi slender, lanceolate, slightly curved, not rising so high as the vertex; 3rd joint much longer than the second. Antennæ simple, smooth. Abdomen elongate-conical, less than twice the length of the thorax. Legs rather short, slightly dilated, laterally flattened; hind tibiæ most densely tufted, with four long spurs. Wings narrow, nearly hyaline, not acute at the tips.

6. *TYRICTACA APICALIS*, n. s. *Fam.* Nigricanti-cyanea, pedibus purpureis, alis iridescentibus subhyalinis aurato subsquamosis, anticis litura magna costali subtrigona.

*Female.* Blackish metallic blue. Legs mostly purple. Wings iridescent, nearly hyaline, slightly covered with gilded scales. Fore wings with a large black subtriangular costal mark beyond the middle. Length of the body 4 lines; of the wings 9 lines.

#### Fam. SPHINGIDÆ, *Leach.*

##### Gen. CHÆROCAMPA, *Duponch.*

7. *Chærocampa Thyelia*, *Linn. Syst. Nat. i. 2. 803* (Sphinx).

Inhabits also West Africa, South Africa, Hindostan, Ceylon, China, and Java.

8. *Chærocampa Lucasii*, *Boisd. MSS. Walk. Cat. Lep. viii. 141.*

Inhabits also Hindostan.

9. *Chærocampa Oldenlandiæ*, *Fabr. Ent. Syst. iii. l. 370. 44* (Sphinx).

Inhabits also Hindostan, Java, and Australia.

10. *Chærocampa Silhetensis*, *Boisd. MSS. Walk. Cat. Lep. viii. 143.*

Inhabits also Hindostan, Ceylon, North China, and Java.

11. *Chærocampa suffusa*, *Walk. Cat. Lep. viii. 146.*

Inhabits also China.

##### Gen. PERGESA, *Walk.*

12. *Pergesa Castor*, *Boisd. MSS. (Deilephila). Walk. Cat. Lep. viii. 153.*

Inhabits also Hindostan and Java.

##### Gen. PANACRA, *Walk.*

13. *Panacra scapularis*, *Boisd. MSS. (Sphinx). Walk. Cat. Lep. viii. 157.*

Inhabits also Hindostan and Java.

Gen. *ACHERONTIA*, *Ochs.*

14. *Acherontia Satanas*, *Boisd. Hist. Nat. Lep.* pl. 16. f. 1.  
Inhabits also Hindostan, Ceylon, China, and Java.

Gen. *DAPHNUSA*, *Walk.*

15. *Daphnusa ocellaris*, *Walk. Cat. Lep.* viii. 238.
16. *DAPHNUSA ORBIFERA*, n. s. *Mas.* Rufescenti-cinerea, alis schistaceo suffusis linea exteriore cinerea angulosa non obliqua, anticis subfalcatis plaga postica exteriore testacea lineolaque adhuc exteriore transversa testacea, posticis lanuginosis macula postica picea angulata cano-marginata.
- Male.* Reddish cinereous. Abdomen and under side paler. Antennæ testaceous, slightly serrated. Wings with a slate-coloured bloom, which is obliquely interrupted near the base, and in the fore wings is divided from the apical part by a cinereous upright zigzag line. Fore wings subfalcate; interior borders lightly excavated, with a tuft of short upright fawn-coloured hairs near the base, and with a large nearly round testaceous spot near the tip; this spot is connected with a marginal streak of the same hue, and between the latter and the interior angle there is a little transverse testaceous line; under side with a piceous exterior line of lunules, and with piceous tips. Hind wings partly lanuginous, more reddish than the fore wings, with a piceous angular hoary-bordered spot on the somewhat truncated interior angle; interior border mostly cinereous; under side with three blackish lines. Length of the body 18 lines; of the wings 48 lines.

Fam. *AGARISTIDÆ*, *Swainson.*Gen. *EUSEMIA*, *Dalman.*

17. *EUSEMIA BIJUGATA*, n. s. *Mas.* Atra, fronte albo biguttata, oculis albo cinctis, thorace maculis quatuor anticis pallide flavis, abdomine fasciis sex luteis subtus luteo fascia subapicali nigra, alis anticis fasciis duabus luteis abbreviatis subexcavatis, posticis ochraceo-rufis basi fascia interrupta fasciaque marginali nigris.
- Male.* Deep black. Head white about the eyes beneath, and with a white dot on each side of the front. Palpi with two white bands. Thorax with four pale-yellow spots in front. Abdomen with six luteous bands; under side luteous, with a black band near the tip. Legs piceous. Fore wings with two abbreviated slightly excavated luteous bands, the interior one much shorter than the exterior one; these bands are pale yellow on the under side, where there are four little white longitudinal streaks nearer the tip. Hind wings orange-red, black at the base, and with a black interrupted excavated band, which is connected by a short line with the black excavated marginal

band; this on the under side contains a row of white points, of which the largest is also apparent on the upper side. Length of the body 8 lines; of the wings 24 lines.

This species comes between *E. maculatrix* and *E. amatrix*.

18. *EUSEMIA HESPERIOIDES*, n. s. *Fœm.* Atræ, subtus ochracea, oculis albo cinctis, abdomine ochraceo-rufo basi apiceque atro, fasciculo apicali ochraceo, alis albo fimbriatis, anticis fascia recta sub-obliqua flavo-alba strigulisque duabus cyaneis, posticis fascia lata interiore ochraceo-rufa.

*Female.* Deep black, ochraceous beneath. Head white about the eyes. Abdomen orange-red, deep black at the base and towards the tip, which has an ochraceous tuft. Wings with a white fringe, except towards the interior angle. Fore wings with some blue scales near the base, and with a little blue streak on each side of the straight slightly oblique yellowish-white band, which is abbreviated near the interior angle. Hind wings with a broad interior orange-red band, which widens towards the interior border. Length of the body 10 lines; of the wings 28 lines.

Very nearly allied to *E. proxima*, but distinct; the fore wings have no exterior mark, and the hind wings have a broader black border.

19. *EUSEMIA MOLLIS*, *Walk. Cat. Lep.* vii. 1774. *Var. Mas.* Nigra, vertice albo guttato, oculis albo cinctis, thorace vittis duabus albis, segmentorum abdominalium marginibus posticis basi albis apice ochraceis, ventre luteo basi apiceque nigro, alis glauco squamosis maculis duabus spatioque marginali inciso nigris maculis submarginalibus elongatis glauco-albidis, anticis macula interiore nigra squamis nonnullis argenteis.

*Var. Male.* Black. Head white about the eyes, and with a white dot on the vertex. Thorax with two white stripes. Abdominal segments with white hind borders towards the base, and with ochraceous hind borders towards the tip; underside except towards the base and tip ochraceous. Wings thickly covered with glaucous scales, with the exception of an incomplete band (which is composed of two large spots in each wing) and of the marginal space, into which the glaucous part emits broad streaks; this space contains glaucous whitish elongated spots, which are most numerous and regular in the hind wings; fringe tipped with white. Fore wings mostly black towards the base and along the costa; some silvery scales in the fore spot of the band and in another spot which is nearer the base.

Inhabits also Hindostan and Malacca.

#### Gen. *ÆGOCERA*, *Latr.*

20. *ÆGOCERA POSTICA*, n. s. *Mas.* Rufescenti-nigra, capite vitta sulphurea, thorace vitta alba, abdomine luteo vitta basali maculaque apicali nigris, alis anticis lineis transversis deviis interruptis cyaneis

maculisque tribus punctoque sulphureis, posticis basi luteis macula exteriore sulphurea.

*Male.* Reddish black. Head with a broad sulphur stripe which extends over the fore part of the palpi. Thorax with a white stripe. Abdomen and legs luteous, the former with a black stripe towards the base and a black apical spot. Fore wings with irregular and interrupted metallic blue transverse lines and with three sulphur spots; middle spot second in size, and having in front of it a sulphur point. Hind wings bright luteous for somewhat less than half the surface from the base, and with a large exterior sulphur spot. Length of the body 7 lines; of the wings 16 lines.

Gen. PHÆGORISTA, *Boisd.*

21. PHÆGORISTA CATACOLOIDES, n. s. *Mas.* Rufescenti-fusca, subtus lutea, abdomine luteo apice fusco, alis anticis purpurascente suffusis albo conspersis fascia exteriore lata venis annulisque duobus albis necnon maculis subtus duabus subquadratis albis lineaque submarginali interrupta nivea, posticis luteis gutta discali margineque fuscis.

*Male.* Reddish brown, luteous beneath. Head in front and palpi blackish; 3rd joint of the palpi less than half the length of the 2nd. Abdomen luteous, brown at the tip. Fore wings more reddish than the thorax, partly tinged with purplish, irregularly white-speckled, with a broad exterior speckled white band which emits two oblique white streaks to the interior border, and is accompanied along its exterior side by two slightly undulating white lines; the dark line which divides the inner white line from the band is bent hindward across the band; veins white; two white discal ringlets, the outer side of the exterior one formed by the band; an irregular and much-interrupted submarginal white line, which has not the yellowish tinge of the band and of the speckles; underside with two subquadrate discal white spots, separated by a space which corresponds with the interior ringlet above. Hind wings bright luteous, with a brown discal dot, and with a cupreous brown border which is broadest in front. Length of the body 8 lines; of the wings 20 lines.

Fam. ZYGÆNIDÆ, *Leach.*

Gen. SYNTOMIS, *Ochs.*

22. SYNTOMIS SCHÖENHERRI, *Boisd. Mon. Zyg.* 112, pl. 7. fig. 1.

Inhabits also Hindostan and Ceylon.

23. SYNTOMIS TETRAGONARIA, n. s. *Mas et Fœm.* Purpurascenti-nigra, capite antico luteo, thorace fasciis tribus strigisque duabus luteis, abdomine fasciis quatuor luteis, alis anticis maculis quinque luteis quadratis plus minusve elongatis, posticis macula lutea magna basali elongata postice incisa.

*Male.* Purplish black. Head luteous in front. Thorax with three luteous

bands and with two luteous humeral stripes. Abdomen with four luteous bands; 1st band basal; 4th broader than the 2nd and the 3rd. Fore wings with five quadrate more or less elongated luteous spots; 1st spot near the base; 2nd larger and a little nearer the base than the 3rd, which is in front; 4th behind the 5th, which is smaller. Hind wings with a large elongated luteous basal spot, which is notched hindward.

*Female*. Luteous marks somewhat deeper than those of the male; fore wings with the 2nd luteous spot more oblique; 4th shorter; 5th longer. Length of the body 5-5½ lines; of the wings 13-14 lines.

Nearly allied to *S. tenuis*.

24. SYNTOMIS EGENARIA, n. s. *Mas*. Cupreo-nigra, capite antico luteo, thorace marginibus strigisque duabus obliquis luteis, abdomine fasciis sex luteis, alis anticis guttis duabus basalibus maculisque sex strigaeque subcostali luteis maculis 5<sup>o</sup> et 6<sup>o</sup> fusco interlineatis, posticis luteis brevissimis litura subcostali margineque fuscis.

*Male*. Cupreous black. Head luteous in front. Thorax luteous-bordered in front and behind, and with an oblique luteous streak on each side. Abdomen with six luteous bands, of which the 4th is broader than the others. Fore wings with two luteous basal dots and with six large luteous spots; 1st and 2nd spots near the base; 1st much broader than the 2nd, accompanied by a subcostal luteous streak; 3rd about half the length of the 4th, which is hindward and oblique; 5th and 6th each divided by a brown vein. Hind wings luteous, very short, with a brown subcostal mark and with a brown marginal band. Length of the body 7 lines; of the wings 16 lines.

Nearly allied to *S. tenuis*.

25. SYNTOMIS PRODUCENS, n. s. *Mas*. Atræ, facie lutea nigro vittata, antennis angulatis, thorace margine antico guttis quatuor fasciaque postica luteis, abdomine fasciis sex luteis fascia 1<sup>a</sup> bis interrupta, alis anticis gutta basali maculisque quatuor elongatis maculaque exteriore subrotunda luteis, posticis striga basali plagaque interlineata luteis.

*Male*. Deep black. Face luteous, with a black stripe. Antennæ distinctly angular at about one-third of the length from the base. Thorax luteous-bordered in front, with two luteous dots on each side, and with a slight luteous band hindward. Abdomen with six luteous bands, of which the basal one is broader than the others, and is obliquely interrupted on each side. Fore wings with a luteous basal spot and with five large discal spots; 1st and 2nd spots approximate, much elongated; 3rd about thrice the breadth of the 4th, which is longer and narrower than the 1st and the 2nd; 5th nearly round. Hind wings with a large luteous basal streak which is notched hindward, and a luteous patch which is divided by a black line; the latter widens towards each end. Length of the body 8 lines; of the wings 20 lines.

Nearly allied to *S. tenuis*.



26. *SYNTOMIS DECORATA*, n. s. *Fæm.* Purpureo-nigra, capite antico luteo, antennis apice albis, thoracis marginibus vittis duabus humeris abdominisque fasciis septem luteis, pedibus luteo fasciatis, tarsis basi albis, alis limpido areolatis basi luteis, anticis apice purpureo-nigris macula subapicali lutea, posticis minimis.

*Female.* Purplish black. Head luteous; vertex and palpi black. Antennæ black, pure white towards the tips. Thorax luteous-bordered in front and behind, with two luteous humeral spots and with two luteous stripes. Abdomen with seven luteous bands; 5th and 6th bands almost connected. Femora and tibiæ with luteous bands; tarsi pure white towards the base. Wings with the disks of the areolets limpid, luteous at the base. Fore wings with a luteous subapical spot and with purplish-black tips. Hind wings very small. Length of the body 5 lines; of the wings 14 lines.

Allied to *S. fenestrata*.

27. *SYNTOMIS DERIVATA*, n. s. *Fæm.* Purpurea, antennis apice thoracis margine antico pectore abdominis macula basali fasciaque albis, alis anticis limpido quinquemaculatis, posticis limpido bimaculatis.

*Female.* Deep purple. Antennæ black, with white tips. Thorax pure white in front. Pectus mostly white. Abdomen with a truncate conical pure white basal spot, and with a band at two-thirds of the length of the same hue. Fore wings with five large limpid spots; 1st spot near the base; 3rd slightly oblique, behind the 2nd; 5th behind the 4th, which it much exceeds in size. Hind wings with two limpid spots; the interior spot much larger than the exterior one. Length of the body 7 lines; of the wings 18 lines.

This species comes between *S. Minceus* and *S. divisa*.

28. *SYNTOMIS TRANSITIVA*, n. s. *Mas.* Purpurea, capitis gutta antennis apice thoracis fascia antica interrupta humeris maculisque quatuor pectoralibus albis, abdomine fasciis duabus interruptis guttisque quatuor lateralibus albis, tarsis basi albis, alis anticis limpido quinquemaculatis, posticis minimis limpido trimaculatis.

*Male.* Deep purple. Head with a white dot in front. Antennæ silvery white towards the tips. Thorax with an interrupted white band on the fore border, and with two humeral white spots. Pectus with two white spots on each side. Abdomen with two interrupted white bands, one at the base, the other at two-thirds of the length, entire beneath, where there are two white dots on each side in front of it. Fore coxæ white beneath; tarsi white towards the base. Wings cupreous-tinged. Fore wings with five limpid spots; 1st spot subelliptical, less than half the length of the 2nd, which is hindward and oblique, and has parallel sides; 3rd, 4th, and 5th spots elliptical, smaller than the 1st; 3rd much in front of the 4th and 5th, which are only divided by a black vein. Hind wings very small, with three limpid spots, which occupy

the whole disk, and are only divided by the black veins. Length of the body 7 lines; of the wings 18 lines.

This species also comes between *S. Minceus* and *S. divisa*.

29. *SYNTOMIS INTERMISSA*, n. s. *Mas.* *Purpurea*, capitis gutta thoracis fascia antica interrupta humeris pectorisque maculis quatuor albis, antennis apicalibus abdomine fascia basali interrupta fascia posteriore guttisque lateralibus albis, tarsi basi albis, alis anticis limpido quinquemaculatis, posticis minimis limpido trimaculatis.

*Male.* Deep purple. Head with a white dot in front. Antennæ with silvery-white tips. Thorax with an interrupted white band on the fore border, and with two humeral white spots. Pectus with two white spots on each side. Abdomen with an interrupted white basal band and with an entire white band at two-thirds of the length; tip bluish; underside with a row of white dots along each side from the base to the hinder band. Fore coxæ white beneath; tarsi white at the base. Fore wings with five limp spots; 1st spot subquadrate, more than half the length of the 2nd, which widens exteriorly and has an oblique exterior side; 3rd nearly linear, much in front of the 4th and the 5th, which together form a short conical spot. Hind wings very small, with three limp spots; 2nd and 3rd spots much smaller than those of the preceding species. Length of the body 6 lines; of the wings 15 lines.

This is sufficiently different from *S. transitiva* to claim a new name; but there is so much resemblance between the two that they may be termed varieties or nearly allied species, according to the various use of those words.

30. *SYNTOMIS SEPARABILIS*, n. s. *Fem.* *Nigra*, capitis gutta antennis apice humerisque albis, abdomine macula basali guttis lateralibus fascia dorsali fascisque ventralibus albis, alis anticis limpido quinquemaculatis, posticis minimis limpido unimaculatis.

*Female.* Black. Head with a white dot in front. Antennæ white towards the tips. Thorax with two humeral white spots. Abdomen with a subquadrate white basal spot; a row of white dots along each side, and white bands beneath from the base to a dorsal white band at two-thirds of the length. Fore coxæ white beneath. Fore wings with five limp spots; 1st spot small, slightly oblong, near the base; 2nd and 3rd oblong-quadrate; 3rd oblique, a little shorter and broader than the 2nd; 4th elliptical; 5th larger than the 4th, double or divided by a black vein. Hind wings very short, with one very large limp spot. Length of the body 5 lines; of the wings 12 lines.

This, though much like *S. intermissa*, is sufficiently distinct to be called another species.

31. *SYNTOMIS DIVISURA*, n. s. *Fem.* *Nigra*, fronte humerisque albis,

abdomine cyaneo, alis anticis maculis quatuor elongatis limpidis, posticis limpidis macula una elongata limpida.

*Female.* Black. Front white. Thorax with two large humeral white spots. Abdomen dark blue. Fore wings with four limpid elongated spots; 1st spot much shorter and more slender than the 2nd, from which it is very narrowly divided; 2nd slightly oblique; 3rd elongate-elliptical, a little longer than the 4th, of which a very small part in front is subdivided by a black vein. Hind wings very small, with one large elongated limpid spot. Length of the body 6 lines; of the wings 14 lines.

This is most allied to *S. separabilis*, from which it may be distinguished by the absence of the basal spot of the fore wings.

32. SYNTOMIS EXPANDENS, n. s. *Mas.* Cyaneo-purpurea, antennis apice humeris tarsisque basi albis, alis anticis maculis sex contiguis limpidis, posticis minimis macula una elongata limpida.

*Male.* Dark-bluish purple. Antennæ shining white towards the tips. Thorax with two humeral white spots. Tarsi white towards the base. Fore wings with six large elongated limpid spots, five of which are only divided from each other by the black veins; the 4th is somewhat more widely divided from the others. Hind wings very small, with one large elongated limpid spot, from which a very small basal part is slightly divided by a black vein.

In this *Syntomis* the characters which are common to the five preceding species begin to pass away.

33. SYNTOMIS LONGIPENNIS, n. s. *Fæm.* Nigra, humeris albis, pectore maculis quatuor albis, abdomine cyaneo-purpureo litura basali maculis quatuor lateralibus fascia posteriore ventreeque albis, alis anticis limpido quadrimaculatis, posticis limpido bimaculatis.

*Female.* Black. Thorax with two humeral white spots. Pectus with two white spots on each side. Abdomen dark-bluish purple, mostly white beneath, with a large truncate-conical white basal spot, and with four lateral white spots between the latter, and a white band which is a little beyond the middle. Fore wings very long, with four limpid spots; 2nd, 3rd, and 4th spots slightly elongated; 1st nearly round, much smaller than the others, in front of and between the 2nd and the 4th; 3rd near the costa, beyond the 4th. Hind wings longer than those of the preceding species of this genus, with two limpid spots; 1st spot, slightly divided by a black vein, larger than the 2nd, which is nearly round. Length of the body 7 lines; of the wings 20 lines.

34. SYNTOMIS DETRACTA, n. s. *Fæm.* Nigra, antennis apice albis, abdomine cyanescenti-viridi, alis anticis macula oblonga basali maculaque exteriore magna transversa excavata limpidis, posticis parvis puncto discali limpido.

*Female.* Black. Antennæ white towards the tips. Abdomen bluish

green. Fore wings with an oblong limpid spot near the base, and with a much larger transverse exterior limpid spot which is excavated in the middle, and especially so on the outer side. Hind wings rather small, with a discal limpid point. Length of the body  $4\frac{1}{2}$  lines; of the wings 12 lines.

Allied to *S. pectoralis* and to *S. albimacula*.

35. SYNTOMIS ALBIPLAGA, n. s. *Fœm.* Cyanea, capite antennis pedibus abdominisque fasciis nigris, alis anticis fascia lata abbreviata albo-vitrea.

*Female.* Dark blue. Head, antennæ, and legs black. Abdomen with black bands. Fore wings beyond the middle with a broad white vitreous band, which is abbreviated at each end and becomes narrow and conical hindward. Hind wings very small. Length of the body 5 lines; of the wings 12 lines.

36. SYNTOMIS FLAVIPLAGA, n. s. *Fœm.* Nigra, antennis apice albis, abdomine fasciis cyaneis, alis anticis fascia latissima abbreviata flavescenti-vitrea.

*Female.* Black. Antennæ white towards the tips. Abdomen with blue bands. Fore wings beyond the middle with a broad pale-yellowish vitreous band, which is abbreviated at each end, and is a little narrower hindward, and is much broader than that of the preceding species. Length of the body 6 lines; of the wings 14 lines.

37. SYNTOMIS BASIFERA, n. s. *Fœm.* Nigra, antennis apice albis, abdomine cyaneo, alis anticis gutta basali oblonga maculaque magna transversa exteriore flavescente vitreis.

*Female.* Black. Antennæ shining white towards the tips. Abdomen dark blue. Fore wings with an oblong pale-yellowish vitreous dot near the base, and with a large transverse spot of the same hue at a little beyond the middle. Length of the body 5 lines; of the wings 12 lines.

#### Gen. PHAUDA, *Walk.*

38. PHAUDA TENSIPENNIS, n. s. *Mas.* Læte ochraceo-rufa, facie perobliqua, proboscide palpisque obsoletis, abdomine maculis duabus lateralibus elongatis albidis, alis perangustis cupreo subinctis, anticis fascia informi nigro-purpurea.

*Male.* Bright orange-red. Vertex prominent; face very oblique, whitish about the mouth. Proboscis and palpi obsolete. Antennæ black, stout, very minutely serrated, orange towards the base. Abdomen linear, keeled above, about thrice the length of the thorax, with a large elongated whitish spot on each side. Legs stout; femora and tibiæ compressed, the latter without spurs. Wings slightly cupreous-tinged, extremely long and narrow. Fore wings with an irregular blackish-purple band beyond the middle; inferior veins from the 1st to the 4th successively more remote from each other. Length of the body 6 lines; of the wings 18 lines.

Allied to *P. flammanis* and to *P. Fortunii*.

Fam. LITHOSIIDÆ, *Steph.*Gen. NYCTEMERA, *Hübner*.

39. *Nyctemera Lacticinia*, *Cram. Pap. Exot.* ii. 47, pl. 128. f. E. (*Phalæna Geometra*).

Inhabits also Hindostan, Ceylon, Java, and China.

40. *Nyctemera latistriga*, *Walk. Cat. Lep.* ii. 397.

Inhabits also Hindostan, Ceylon, and Java.

41. *Nyctemera Coleta*, *Cram. Pap. Exot.* iv. 153, pl. 368. f. H. (*Phalæna Geometra*).

Inhabits also Hindostan, Ceylon, and Java.

42. NYCTEMERA ABRAXOIDES, n. s. *Fam.* Alba, capite thoraceque luteis nigro maculatis, abdomine guttis lateralibus nigris, alis anticis guttis basalibus nigris vitta postica fascia obliqua albo uniguttata fasciaque marginali lata albo maculata fuscis, posticis fascia marginali excavata fusca maculam albam includente.

*Female.* White. Head and thorax luteous. Head with a black spot on the vertex, and with another on the face. Palpi at the tips and antennæ black. Thorax with eight black spots. Abdomen with black dots along each side. Fore wings with black dots at the base, with a brown stripe along the interior border, with an irregular oblique brown band which contains in front a white dot and emits two streaks to the base, and with a broad brown marginal space, the latter containing four white spots of various size; a white point on the fringe by the interior angle. Hind wings with a brown marginal band, which is much excavated, contains a white spot in front, and emits angles on the fringe. Length of the body 7 lines; of the wings 20 lines.

Nearly allied to *N. selecta*.

Gen. EUSCHEMA, *Hübner*.

This genus corresponds to the family *Hazidæ* of Guénée, and is included by him in the Geometrites, to which it has some resemblance.

43. *Euschema subrepleta*, *Walk. Cat. Lep.* ii. 406. *Hazis Bellonaria*, *Guén. Fal.* ii. 493, pl. 18. f. 1.

Inhabits also Ceylon and Malacca.

44. *Euschema Malayana*, *Guér. Voy. Delessert, Hist. Nat.* 89, pl. 23. f. 2 (*Hazis*).

Inhabits also Hindostan.

45. EUSCHEMA GLAUDESCENS, n. s. *Mas.* Cinerea, capite thoraceque viridi-fusco fasciatis, abdominis apice subtus ventrequ luteis, alis glauco-viridibus, anticis fasciis quatuor deviis strigisque obscure purpureis, posticis apud margines luteis fasciis duabus obscure purpureis 2<sup>a</sup> maculari submarginali.

*Male.* Cinereous. Head with a greenish-brown band on the vertex,

and with a spot of the same hue on the front. Antennæ rather broadly pectinated. Thorax with two greenish-brown bands. Pectus and abdomen towards the tip beneath luteous. Wings glaucous green. Fore wings with four irregular dark-purple bands, which are connected together by streaks, and thus divide the ground hue into spots; 1st band emitting two streaks to the base; 4th marginal. Hind wings luteous along most of the interior and exterior borders, with two dark-purple bands; 2nd band macular, submarginal. Length of the body 9 lines; of the wings 28 lines.

Allied to *E. plena*.

46. *EUSCHEMA RESUMPTA*, n. s. *Mas.* Nigra, capite fasciis duabus fronteque albis, thorace punctis albis, pectore cyaneo plagis albis, abdomine flavo fasciis nigris subtus albo, alis anticis cupreo-nigris puncto basali fascisque quatuor macularibus albis aut flavis, posticis flavis strigis exterioribus connexis cupreo-nigris.

*Male.* Black. Head with a white band on the vertex, and another behind; front white. Antennæ very slightly pectinated. Thorax with some white points hindward. Pectus blue, with white patches on each side. Abdomen yellow, white beneath, with black dorsal bands. Fore wings cupreous black, narrow, with a yellow point at the base, and with four macular bands; 1st and 2nd bands yellow, each composed of two spots, which are very much larger in the 2nd band than in the 1st band; 3rd and 4th bands white; 3rd composed of a large spot in front and of two smaller elongated spots hindward; 4th composed of five elongated spots; exterior border extremely oblique. Hind wings bright yellow, with irregular cupreous-black exterior streaks, which are mostly connected at each end, and thus include three large elongated spots. Length of the body 8 lines; of the wings 22 lines.

Most nearly allied to *E. flavescens*.

47. *EUSCHEMA TRANSDUCTA*, n. s. *Mas.* Glauco-cinerea, thorace fasciis duabus nigris, pectore luteo, abdomine fasciis cervinis apice luteo, alis purpurascanti-nigro notatis, macula discali maculisque marginalibus maximis, linea exteriore angulosa, anticis strigis duabus basalibus strigaeque transversa obliqua, posticis maculis duabus marginalibus luteis.

*Male.* Glaucous cinereous. Antennæ moderately pectinated. Thorax with two black bands. Pectus luteous. Abdomen with fawn-coloured bands, luteous at the tip. Wings ample, with purplish-black markings; discal spot very large; exterior line very zigzag; marginal spots very large, mostly connected in the fore wings. Fore wings with two streaks proceeding from the base, and bounded by an oblique exterior streak; exterior border less oblique than in most species of the genus. Hind wings with a dot between the discal spot and the interior bor-

der; a luteous spot at the tip of the costa, and a much larger one by the interior angle. Length of the body 9 lines; of the wings 24 lines.

Most nearly allied to *E. Malayana*.

48. *EUSCHEMA RECESSA*, n. s. *Mus.* Cinereo-glauca, thorace fascia strigisque duabus nigris, abdomine fasciis nigris apice ventree luteis, alis purpurascenti-nigro notatis, maculis duabus discalibus, linea exteriore angulosa maculari, maculisque marginalibus elongatis, anticis striga postica interiore liturisque duabus basalibus elongatis.

*Male.* Cinereous glaucous: in structure like the preceding species. Antennæ moderately pectinated. Thorax with a black band in front, and with two black humeral streaks. Abdomen with a black band on the fore border of each segment; tip and underside luteous. Wings with purplish-black markings; discal spot very large, nearly round, with a smaller spot between it and the interior border; exterior line zigzag, macular; marginal band composed of elongated spots, which are longest in the fore wings. Fore wings with two elongated marks near the base, and with a little streak behind the 2nd discal spot. Length of the body 10 lines; of the wings 28 lines.

#### Gen. POMPELON, *Walk.*

49. *Pompelon marginata*, *Guér. Voy. Delessert, Hist. Nat.* 83, pl. 25. f. 1 (*Gynautocera*).

Inhabits also Hindostan and Java.

#### Gen. CYCLOSIA, *Hübner*.

50. *CYCLOSIA NOCTIPENNIS*, n. s. *Fæm.* Nigra, capite albo vario, thorace punctis duobus albis, abdomine guttis lateralibus albis, alis patulis albo aut cyaneo punctatis, punctis subtus bene determinatis, strigis marginalibus duplicatis albis.

*Female.* Black. Head white about the eyes, with a white band in front of the antennæ, and with a white point on the vertex. Antennæ very slightly pectinated. Thorax with two humeral white points. Abdomen with white dots along each side, and with a white apical streak on each side. Wings long, very ample, with white or blue points, which are by far the most numerous on the underside; a row of double marginal white streaks, which diminish successively in length from the tips of the fore wings, and disappear on the exterior border of the hind wings. Length of the body 11 lines; of the wings 40 lines.

It closely resembles some species of *Euplaea* in its markings.

51. *CYCLOSIA PIERIDOIDES*, *Boisd. Herr.-Sch. Lep. Exot.* pl. 1. f. 6 (*Epyrgis*). Var.? *Mas.* Cupreo-nigra, subtus alba, capite thoraceque albo guttatis, abdomine lincis duabus lateralibus et segmen-

torum marginibus posticis albis, alis cinereo-albis venis nigro marginatis, anticis nigro quadrimaculatis, posticis nigro unimaculatis.

*Male.* Cupreous black, slender, white beneath. Head and thorax with white dots. Abdomen with a white line along each side, and with a white band on the hind border of each segment. Wings cinereous white, with black stripes along all the veins; exterior border black. Fore wings with four irregular black spots, two of them subcostal, and two near the interior angle; costa very convex. Hind wings with a subcostal black spot. Length of the body 9 lines; of the wings 30 lines.

This species in its wing-markings has a great likeness to the genus *Histia*.

52. *CYCLOSIA PIEROIDES*, n. s. *Mas.* Nigra, subtus alba, capite thoraceque albo notatis, thorace postico abdomineque glaucescenti-cæruleis, alis albis cæruleo venosis, anticis apud marginem exteriorem nigricantibus, posticis subtus flavescentibus.

*Male.* Black, white beneath. Head and thorax with white marks. Antennæ moderately pectinated. Thorax hindward and abdomen pale glaucous blue. Wings white; veins blue. Fore wings above with the veins broadly bordered with black towards the tips, where the disks of the areolets are speckled with black; underside hardly striped with black. Hind wings tinged with yellow beneath, where the veins are more black-bordered than on the upper surface. Length of the body 8 lines; of the wings 22 lines.

The resemblance of this species, of *C. dissimulata*, and of *C. ficta*, to some species of *Pieris* is very remarkable.

53. *CYCLOSIA TENEBROSA*, n. s. *Mas.* Obscure rufescenti-purpurea, antennis cyaneis subpectinatis, abdomine cyaneo, alis anticis fascia exteriore e strigis lineaque submarginali punctulari albis.

*Male.* Dark reddish purple. Antennæ and abdomen metallic blue, the former slightly pectinated. Wings moderately long and broad. Fore wings with an exterior upright band composed of longitudinal white streaks; a submarginal line of white points, joining the band by the interior angle; costa convex; exterior border straight. Length of the body 8 lines; of the wings 24 lines.

Allied to *C. fuliginosa*.

54. *CYCLOSIA DISSIMULATA*, n. s. *Fæm.* Alba, capite antico thoracisque suturis nigris, antennis cyaneis subpectinatis, alis fascia exteriore diffusa fascia marginali maculas duas albas includente strigisque intermediis fuscis, anticis fusco venosis, posticis margine interiore subtus flavo.

*Female.* White. Head in front and sutures of the thorax black. Antennæ metallic blue, very slightly pectinated. Abdomen glaucous blue, white at the base. Wings with an exterior diffuse brown band,



which is connected by streaks along the veins with the brown marginal band, and contains two white spots in front. Fore wings rounded at the tips; veins more or less bordered with brown; costa and exterior border convex. Hind wings yellow beneath along the interior border. Length of the body 7 lines; of the wings 22 lines.

55. *CYCLOSIA FICTA*, n. s. *Fæm.* Nigricanti-cyanea, oculis albo cinctis, abdomine subtus pedibusque albis, alis dimidio exteriore nigro, anticis nigro venosis extus albido strigatis subtus basi nigris, posticis spatio medio flavo basi subtus rufis.

*Female.* Blackish metallic blue. Head white about the eyes. Antennæ very slightly pectinated. Abdomen white beneath. Legs white; coxæ streaked with blue. Wings ample, with nearly half the exterior surface black, which occupies much less space on the underside. Fore wings rounded at the tips; veins slightly bordered with black; some diffuse whitish streaks in the black part; underside black at the base; costa convex; exterior border very slightly excavated hindward. Hind wings slightly truncate at the tips, with the middle part yellow, which hue is more widely spread on the underside, where the base is red and black-bordered and where the veins are black-bordered; the underside has also in front two elongated white spots, one of which appears also above, though of a smaller size. Length of the body 9 lines; of the wings 28 lines.

Gen. *CHALCOSIA*, *Hüb.*

56. *CHALCOSIA COLIADOIDES*, n. s. *Fæm.* Cyaneo-alba, capite coccineo antice aurato-viridi, antennis cyaneis vix pectinatis, thorace cyaneo vittis quatuor albis margine antico coccineo, alis flavis lituris cupreo-nigris cyaneo micantibus, anticis spatio marginali obscuro fasciam flavam dentatam arcuatam antice dilatatam includente macula discali rotunda maculisque duabus elongatis posticis striga subtus basali, posticis linea submarginali maculari.

*Female.* Metallic white. Head crimson, golden green in front. Antennæ metallic blue, very slightly pectinated. Thorax metallic blue, with four white stripes, crimson in front. Wings with blue reflections on some of the cupreous-black marks. Fore wings with a dark marginal space which contains a dentate curved yellow band, is interrupted by yellow lines along the veins, and is much dilated in front; a round spot on the fore part of the disk, and two elongated spots hindward; underside with a broad streak proceeding from the base to nearly half the length. Hind wings with a macular submarginal line which is bent in front, or indicates there the commencement of a second line.

Var.  $\beta$ . Fore wings with the dark space more divided into spots and containing a broader band. Length of the body 9-10 lines; of the wings 24-26 lines.

Nearest allied to *C. Adalifa*.

57. *CHALCOSIA FRAGILIS*, n. s. *Fæm.* Alba, capite thorace et antennis cyaneis, thoracis suturis albis, alis lituris nigris purpurascenti-cyaneo micantibus, anticis fasciis duabus latis 1<sup>a</sup> interrupta 2<sup>a</sup> postice abbreviata fascia marginali antice lata, posticis fascia submarginali intus excavata.

*Female.* White. Head, thorax, and antennæ metallic blue, the latter very slightly pectinated. Thorax with white sutures. Wings with black markings which have purplish-blue reflections. Fore wings with two broad bands; the first interrupted in the middle or forming two large spots, the second abbreviated hindward; a marginal band, broadest in front; costa very convex; exterior border hardly convex. Hind wings with a submarginal band, which is deeply excavated on the inner side, recedes from the border in front, and is nearly marginal in front. Length of the body 6 lines; of the wings 18 lines.

Gen. *ARYCANDA*, *Walk.*

*Arycanda* is nearly allied to *Isbarta* and to *Pintia*.

58. *ARYCANDA HESTINOIDES*, n. s. *Mas.* Cyaneo-nigra, oculis albo cinctis, antennis cyaneis, thorace guttis quinque albis, abdominis segmentorum marginibus posticis ventrique albis, alis areolarum discis schistaceo-albis subtus cyaneis albo maculatis, maculis marginalibus cyaneis, posticis subtus apud marginem interiorem luteis.

*Male.* Bluish black. Head white about the eyes. Palpi ferruginous beneath. Antennæ metallic blue, moderately pectinated. Thorax with two white dots on each side and one hindward. Abdominal segments with white hind borders; underside white. Wings with the disks of the areolets, except towards the tips of the fore wings, slaty white; this hue is composed of scales; underside blue, with elongated white spots and with fewer and larger black spots. Fore wings with a row of blue marginal spots. Hind wings luteous along the interior border on the underside. Length of the body 9 lines; of the wings 26 lines.

The wing-markings of this species are nearly similar to those of the genus *Hestina*.

Gen. *PIDORUS*, *Walk.*

*Leucopsumis*, *Hüb. Verz. Schm.* 177.

59. *PIDORUS SORDIDUS*, n. s. *Mas.* Saturate cyaneus, subtus albus, alis ferrugineo-nigris viridi tinctis, anticis fascia exteriori informi albidâ submaculari, posticis albidis cyaneo marginatis.

*Male.* Deep metallic blue, mostly white beneath. Antennæ moderately pectinated. Wings ferruginous black, tinged with metallic green. Fore wings with an irregular upright dingy white exterior band, which is almost macular, and is intersected by the brown veins. Hind wings

dingy white, except towards the exterior border. Length of the body 6 lines; of the wings 20 lines.

Gen. DIDINA, n. g.

*Fam.* *Corpus* gracile. *Facies* producta. *Proboscis* et *palpi* vix conspicui. *Antennæ* subpectinatae. *Pedes* graciles; *tibiæ* posticæ non calcaratae. *Alæ* amplæ; anticæ apice rotundatæ, costa margineque exteriore subconvexis; posticæ abdomen longe superantes.

*Female.* Body slender. Face very prominent. Proboscis and palpi rudimentary. *Antennæ* slightly pectinated. Abdomen with radiating bristles at the tip, which is furnished with a long retractile oviduct. Legs slender; hind *tibiæ* without spurs. Wings ample. Fore wings rounded at the tips; costa and exterior border slightly convex, the latter very oblique; 1st and 2nd inferior veins contiguous at the base; 3rd much nearer to the 2nd than to the 4th. Hind wings extending much beyond the abdomen.

This genus comes between *Histia* and *Pompelon*.

60. DIDINA THECLOIDES, n. s. *Fam.* Ferrugineo-nigra viridi subnitens, capite antennis thoraceque antico cyaneis.

*Female.* Ferruginous black, with a dark-green tinge. Head, antennæ, and fore part of the thorax metallic blue. Wings of one colour above and beneath. Length of the body 7 lines; of the wings 24 lines.

Gen. MILLERIA, *Boisd., Herr.-Sch.*

*Laurion*, *Walk. Cat. Lep.* ii. 426.

Some species of *Chalcosia*, as well as the type of the genus *Laurion*, are included by Herrich-Schäffer in *Milleria*.

61. MILLERIA BIFASCIATA, n. s. *Mas.* Nigro-fusca, antennis late pectinatis, thoracis margine antico coccineo, alis sat angustis, anticis fascia exteriore subobliqua pallide lutea.

*Male.* Blackish brown. *Antennæ* broadly pectinated. Fore border of the thorax crimson. Wings rather narrow. Fore wings slightly acuminate, with a broad, pale-luteous, slightly oblique exterior band; costa convex; exterior border hardly convex, very oblique. Length of the body 4 lines; of the wings 12 lines.

This species represents *M. gemina*.

Gen. SORITIA, *Walk.*

62. SORITIA BIPARTITA, n. s. *Mas.* Nigro-viridis, subtus lutea, antennis cyaneis, thoracis margine antico rufo, abdomine luteo, alis anticis flavescenscibus fasciis deviis e maculis elongatis viridibus, posticis spatio marginali nigro postice attenuato.

*Male.* Blackish metallic green, luteous beneath. *Antennæ* metallic blue, moderately pectinated. Thorax red along the fore border. Ab-

domen luteous. Fore wings yellowish, narrow, rounded at the tips, with numerous elongated dark-green spots which form irregular bands; costa convex; exterior border very oblique. Hind wings luteous, with a black marginal space which is attenuated hindward. Length of the body  $4\frac{1}{2}$  lines; of the wings 12 lines.

Gen. *HYPSA*, *Hüb.*

63. *Hypsa Silvandra*, *Cram. Pap. Exot.* iv. 155, pl. 369. f. D. (*Phaëna*).

Inhabits also Hindostan, China, Java and Australia.

64. *Hypsa Dama*, *Fabr. Ent. Syst.* iii. 2. 22. 69 (*Noctria*).

*Hypsa lanceolata*, *Walk. Cat. Lep.* vii. 1675.

Inhabits also Celebes and New Guinea.

65. *Hypsa egens*, *Walk. Cat. Lep.* ii. 453.

Inhabits also Hindostan and Java.

66. *Hypsa Javana*, *Cram. Pap. Exot.* iii. 146, pl. 274. f. C. (*Phaëna*).

Inhabits also Hindostan and Java.

67. *HYPSA PRIVATA*, n. s. *Fœm.* Lutea, palpis apice nigris, thorace guttis duabus nigris, abdomine guttis dorsalibus maculisque subtus lateralibus nigris, pedibus albis nigro vittatis, alis anticis cervinis albo-venosis basi luteis nigro guttatis, posticis albis fusco late marginatis.

*Female.* Luteous. Third joint of the palpi black, full half the length of the 2nd. Thorax with a black dot on each side in front. Abdomen with one row of black dots; underside with a row of black spots on each side. Legs white, striped with black. Fore wings fawn-colour with some black dots very near the base, which is luteous; veins white. Hind wings white, with a broad brown marginal band which is attenuated hindward. Length of the body 9 lines; of the wings 24 lines.

Gen. *CARANUSCA*, n. g.

*Mas.* *Corpus* robustum. *Proboscis* vix conspicua. *Palpi* porrecti, caput superantes; articulus 3<sup>us</sup> longiconicus, 2<sup>i</sup> triente brevior. *Antennæ* setaceæ, vix pubescentes. Thorax lævis, squamosus. *Abdomen* conicum, subcarinatum, apice obtusum, alas posticas perpauculo superans. *Pedes* robusti; tibiæ posticæ calcaribus quatuor parvis. *Alæ* spissæ, oblongæ, discolores; anticæ apice rectangulatæ, costa recta, margine exteriori subflexo.

*Male.* Body thick. *Proboscis* rudimentary. *Palpi* porrect, extending beyond the head, hardly ascending; 3rd joint elongate-conical, less than one-third of the length of the 2nd. *Antennæ* setaceous, very minutely pubescent. Thorax smooth, with squamous hairs. Ab-

domen conical, slightly keeled above, extending very little beyond the hind wings, obtuse but hardly tufted at the tip. Legs robust; hind tibiae with four short spurs. Wings stout, elongate. Fore wings rectangular at the tips; costa straight; exterior border slightly bent in the middle, its hind part very oblique; 1st and 2nd inferior veins connected for some space; 3rd very near the 2nd; 4th remote from the 3rd. Hind wings unlike the fore wings in colour.

Allied to *Hypsa*.

68. *CARANUSCA RUBRIFERA*, n. s. *Mas.* Ferrugineo-fusca, vertice thoracisque disco abdominisque basi rufis, alis anticis linea obliqua recta cinerea, posticis flavis apice margineque exteriore ferrugineo-fuscis.

*Male.* Ferruginous brown. Vertex red. Thorax with a very broad red stripe. Abdomen red at the base. Fore wings with a cinereous line which proceeds from near the tip of the costa to two-thirds of the length of the interior border. Hind wings bright yellow, ferruginous brown towards the tips and along the exterior border; interior border with a yellowish-cinereous stripe which widens hindward. Length of the body 7 lines; of the wings 18 lines.

#### Gen. *HYPOPREPIA*, *Hübner*.

69. *HYPOPREPIA CRUCIATA*. *Mas et Fæm.* Lateritio-rufa, capite thorace alisque anticis basi nigro punctatis, abdominis maris apice subtus nigro, alis anticis nonnunquam flavescente variis linea obliqua lineisque duabus transversis strigisque marginalibus fimbriaque nigricantibus, posticis albidis.

*Male and Female.* Brick-red, more rosy beneath. Head, thorax, and base of the fore wings with black points. Proboscis long. Palpi porrect, short, slender, not extending beyond the front. Antennæ of the male minutely setulose. Abdomen whitish rosy, except at the tip. Abdomen of the male black beneath towards the tip. Fore wings occasionally here and there yellowish, with blackish markings, which are broader in the female than in the male, an oblique line which is traversed at right angles by another line, and an exterior curved line which emits streaks to the exterior border; fringe blackish. Hind wings whitish, with a rosy tinge which is most prevalent along the exterior border. Length of the body 5-6 lines; of the wings 12-18 lines.

70. *HYPOPREPIA RUBRIGUTTA*, n. s. *Mas.* Luteo-flava, capitis puncto thoracisque punctis duobus nigris, thorace postico rufo, alis anticis punctis basalibus nigris fasciisque duabus latissimis connexis strigas coccineas includentibus.

*Male.* Luteous yellow. Head with a black point on the vertex. Antennæ very minutely setulose. Thorax red hindward, with a black point on each shoulder. Abdomen and hind wings pale yellow.

Fore wings with two very broad brown bands, which are connected by a short broad discal stripe, and contain several crimson streaks; some black points at the base, to which the 1st irregular band emits a streak; 2nd band much broader than the 1st, most irregular along the outer side. Length of the body 5 lines; of the wings 12 lines.

71. *HYPOPREPIA EUPREPIOIDES*, n. s. *Fæm.* Testaceo-flava, capitis vitta thoracisque fasciis duabus lateribusque fuscis, alis anticis vittis tribus fasciisque quinque variis fuscis fascia 5<sup>a</sup> latissima marginali maculas tres elongatas includente.

*Female.* Testaceous yellow. Head with a brown stripe. Thorax brown along each side, and with two brown bands. Abdomen paler than the thorax, except towards the tip. Fore wings with brown markings, which have a glaucous bloom, and consist of three stripes and five bands; 1st stripe costal; 3rd emitting streaks to the interior border; 1st band basal; 2nd curved outward; 3rd angular inward, double hindward; 4th retracted hindward; 5th very broad, containing three elongated yellow spots. Hind wings paler than the fore wings, with an irregular brown subapical band, which is most distinct on the underside. Length of the body 5½ lines; of the wings 15 lines.

72. *HYPOPREPIA DIVISA*, n. s. *Mas et Fæm.* Testaceo-flava, alis anticis linea brevi costali punctoque basalibus nigricantibus necnon fasciis duabus e lineis lineaque intermedia transversa undulata nigricantibus.

*Male and Female.* Testaceous yellow. Antennæ of the male distinctly setulose. Abdomen much paler than the thorax, except towards the tip in the male, where the appendages are large. Fore wings with a short blackish costal line and a blackish point at the base, and with two rows of longitudinal blackish lines; space between the rows including an undulating transverse blackish line. Hind wings much paler than the fore wings. Length of the body 5 lines; of the wings 11–13 lines.

73. *HYPOPREPIA PERPUSILLA*, n. s. *Fæm.* Roseo-lutescens, alis anticis puncto basali vitta media lineisque quatuor transversis deviis nigricantibus.

*Female.* Pale luteous, tinged with rosy red. Abdomen and hind wings pale testaceous. Fore wings with a black point at the base, and with blackish markings; these consist of a middle stripe which is traversed by four irregular lines. Length of the body 3 lines; of the wings 8 lines.

This species has some resemblance to *Miltochrista miniata*.

#### Gen. *LITHOSIA*, *Fabr.*

74. *Lithosia entella*, *Cram. Pap. Exot.* iii. 27, pl. 208. f. D. (*Phælæna Tinea*).

Inhabits also Hindostan. The specimen here recorded is a male, and it differs from the Hindostan female in having the 1st band of the fore wings much less dilated interiorly, and in the narrower apical band.

75. *LITHOSIA MAGNIFICA*, n. s. *Fæm.* Aurato-lutea, thorace vittis duabus latis abbreviatis pedibusque cyaneo-viridibus, alis anticis vitta costali macula basali fasciaque media cyaneo-viridibus.

*Female.* Gilded luteous. Antennæ black. Thorax with a broad short squamous metallic bluish-green stripe on each side. Legs bluish-green, except towards the base of the femora. Fore wings with bluish-green markings; a stripe along the costa, excavated in the middle and extending also along the exterior border; a spot hindward near the base, and a middle band, which is dilated on the middle of the interior side. Length of the body 9 lines; of the wings 24 lines.

This species and *L. entella* form a group in the genus.

76. *Lithosia antica*, *Walk. Cat. Lep.* ii. 505.

Inhabits also Ceylon.

77. *Lithosia tetragona*, *Walk. Cat. Lep.* ii. 510.

Inhabits also Hindostan.

The specimen here noticed differs from that of Hindostan in the much shorter quadrate mark on the fore wings. *L. signata*, from China, belongs to the same group.

78. *LITHOSIA INTACTA*, n. s. *Fæm.* Lutea, crassa, abdomine pallido pilis longis vestito, alis anticis apice rectangulatis, posticis pallidis margine interiore fimbriato.

*Female.* Luteous, very stout. Tegulæ of the thorax slightly furrowed. Abdomen pale, clothed above with long hairs. Fore wings like the thorax in colour, nearly rectangular at the tips; costa straight. Hind wings much paler, with long hairs along the interior border. Length of the body 7 lines; of the wings 18 lines.

Very nearly allied to *L. innotata*, *L. conformis*, and *L. brevipennis*.

79. *LITHOSIA LEUCANIODES*, n. s. *Fæm.* Pallide testacea, thorace maculis tribus nigris, pedibus supra nigricantibus, alis anticis lineis tribus nigris 1<sup>a</sup>, 2<sup>a</sup>que bifurcatis.

*Female.* Pale testaceous. Head and fore part of the thorax with a slight luteous tinge. Antennæ black. Thorax with a black discal spot and with an elongated black spot on each of the tegulæ. Legs blackish above. Fore wings with three black lines; 1st line furcate beyond the middle, its fore branch also furcate near the tip; 2nd line furcate at one-third of its length, its fore branch furcate at two-thirds of its length. Hind wings not paler than the fore wings. Length of the body 5 lines; of the wings 16 lines.

80. *LITHOSIA NIGRICANS*, n. s. *Fæm.* Nigricans, fronte thoracis margine antico ventre pedibusque testaceis, alis anticis costa fimbriataque testaceis.

*Female.* Blackish. Front, fore border of the thorax, shoulders, abdomen beneath, and legs testaceous. Fore wings narrow; costa straight, testaceous; exterior border hardly oblique; fringe testaceous. Length of the body 4 lines; of the wings 10 lines.

Allied to *L. serva*, from which it may be distinguished by its smaller size and by its much darker colour.

81. *LITHOSIA ASPERSA*, n. s. *Mas et Fæm.* Pallide lutea, alis anticis acutis cervino dense conspersis costa extus subconvexa margine exteriori subflexo subtus nigricante, posticis pallide testaceis.

*Male and Female.* Pale luteous. Antennæ of the male very stout. Tegulæ of the thorax furrowed. Abdomen and hind wings pale testaceous, the former long in the male, and with a large apical tuft of hairs. Fore wings thickly speckled with fawn-colour; costa slightly convex exteriorly; tips acute; exterior border straight, very slightly bent in the middle, with a blackish band on the underside. Length of the body 5 lines; of the wings 14 lines.

82. *LITHOSIA APICALIS*, n. s. *Mas.* Lutea, robusta, capite thoraceque nigricantibus, alis anticis purpurascente suffusis apice saturatoribus.

*Male.* Luteous, robust. Head, palpi, antennæ, and thorax blackish. Antennæ distinctly setulose. Abdomen with a few long hairs. Fore wings mostly covered with a slight purplish tinge, which hue is deepest about the tips, where its outline is distinctly marked. Length of the body  $4\frac{1}{2}$  lines; of the wings 12 lines.

83. *LITHOSIA ROTUNDIPENNIS*, n. s. *Fæm.* Lutea, robusta, palpis apice pedibusque supra nigris, alis anticis latiusculis acutis vix falcatis striga subtus marginali nigricante costa convexa, posticis pallide testaceis.

*Female.* Luteous, robust. Palpi black towards the tips. Abdomen and hind wings pale testaceous. Legs black above. Fore wings rather broad, acute, and almost subfalcate at the tips, with a blackish streak beneath along the fore part of the exterior border; costa convex; exterior border oblique hindward. Length of the body 5 lines; of the wings 13 lines.

Allied to *L. brevipennis*, from which it may be distinguished by the fore wings, which are broader, and have a convex costa, a much less oblique exterior border, and a blackish streak beneath.

84. *LITHOSIA NODICORNIS*, n. s. *Mas.* Pallide cervina, robusta, capite uscescente, antenni crassis basi incis, abdominis lateribus subfasciculatis, alis anticis striga marginali nigricante, posticis costa dilatata incrassata fimbriata.

*Male.* Pale fawn-colour, stout. Head and palpi brownish. Antennæ robust, compressed, setulose, slightly notched near the base. Abdomen with slight tufts along each side. Fore wings narrower than those of *L. rotundipennis*; costa hardly convex; tips acute, not sub-



falcate, a blackish streak beneath along the fore part of the exterior border. Hind wings with the costa dilated and much incrassated, and furnished with a long reflexed fringe. Length of the body 5 lines; of the wings 12 lines.

85. *LITHOSIA FASCICULOSA*, n. s. *Mas.* Fulva, robusta, capite antice fusco, antennis basi incrassatis incis, abdomine longo, alis anticis acutis, posticis albidis margine interiore lutescente dense fasciculato.

*Male.* Tawny, stout. Head in front and palpi brown. Antennæ setulose, incrassated, and notched at the base. Abdomen long, extending far beyond the hind wings, clothed with long hairs except towards the tip; apical tuft of moderate size. Fore wings acute; costa slightly convex; exterior border very oblique. Hind wings whitish; interior border densely tufted with luteous hairs; costa very much dilated. Length of the body 8 lines; of the wings 16 lines.

This is nearly allied to the four preceding species, and with them forms a section in the *Lithosiæ*, and has some resemblance to *Nonagria*.

86. *LITHOSIA SIMPLEX*, n. s. *Mas.* Pallide lutea, abdomine pallide cinereo valvulis apicalibus ascendentibus, alis breviusculis, anticis apice subrotundatis.

*Male.* Pale luteous. Antennæ minutely setulose. Abdomen pale cinereous, except towards the tip; apical valves large, ascending. Wings rather short. Fore wings somewhat rounded at the tips; costa slightly convex; exterior border slightly convex and oblique. Hind wings much paler. Length of the body 4 lines; of the wings 12 lines.

87. *LITHOSIA REVERSA*, n. s. *Fæm.* Lutea, latiuscula, abdomine alisque posticis nitentibus fusciscenti-cervinis cupreo subinctis, alis anticis breviusculis.

*Female.* Luteous. Body rather broad and flat. Abdomen and hind wings shining, brownish fawn-colour, with a slight cupreous tinge; tip of the abdomen testaceous. Wings short. Fore wings nearly rectangular at the tips; costa very slightly convex. Hind wings with a testaceous fringe. Length of the body  $2\frac{3}{4}$  lines; of the wings 7 lines.

88. *LITHOSIA MURICOLOR*, n. s. *Fæm.* Murina, vertice corpore subtus pedibusque pallide testaceis, alis anticis apice subrotundatis costa fimbriaque testaceis.

*Female.* Mouse-colour. Vertex, underside, and legs pale testaceous. Wings rather short. Fore wings somewhat rounded at the tips; costa testaceous, nearly straight; exterior border slightly oblique; fringe testaceous. Length of the body  $2\frac{1}{2}$  lines; of the wings 6 lines.

89. *LITHOSIA FULIGINOSA*, n. s. *Mas.* Fusca, antennis submoniliformibus, abdomine alisque posticis cinereis, alis anticis apice rectangulatis fimbria cinerea.

*Male.* Brown, more cinereous beneath. Antennæ submoniliform, distinctly setulose. Abdomen cinereous; apical tuft rather large, divergent. Fore wings rectangular at the tips; costa almost straight; exterior border slightly oblique; fringe cinereous. Hind wings cinereous; fringe paler. Length of the body 3 lines; of the wings 8 lines.

90. *LITHOSIA NEBULOSA*, n. s. *Mas.* Testacea, sat robusta, thoracis tegulis sulcatis, alis anticis apice subrotundatis fascia exteriore diffusa angulata strigisque submarginalibus cervinis.

*Male.* Testaceous, rather stout. Antennæ minutely setulose. Tegulæ of the thorax furrowed. Abdomen whitish, except at the tip, which is furnished with large tufted appendages. Wings rather narrow. Fore wings slightly rounded at the tips, with a diffuse deeply angular fawn-coloured band beyond the middle, and with more exterior streaks of the same hue; costa straight; exterior border rather oblique. Hind wings very much paler than the fore wings. Length of the body 4 lines; of the wings 10 lines.

91. *LITHOSIA HYPOPREPIOIDES*, n. s. *Fæm.* Testacea, thorace fascia maculari nigricante, alis lineis duabus transversis undulatis strigisque exterioribus nigricantibus, anticis gutta discali linea transversa interiore maculisque quatuor elongatis basalibus nigricantibus.

*Female.* Testaceous. Head and fore part of the thorax somewhat luteous, the latter with a macular blackish band. Wings elongate, with blackish markings. Middle and exterior lines undulating, the latter emitting streaks along the veins to the blackish exterior border. Fore wings hardly acute, with a basal costal line, and with four elongated basal marks, which are bounded by a very deeply curved interior line; a dot between the middle line and the exterior line, the latter forming a deep outward angle. Length of the body 3 lines; of the wings 10 lines.

92. *LITHOSIA SYNTOMIOIDES*, n. s. *Mas.* Fusca, subtus flavescens, antennis pubescentibus subcontortis, thorace vittis quatuor flavescens, abdominis fasciculo cervino, alis anticis macula basali maculisque sex discalibus elongatis flavescens, posticis flavescens fusco late marginatis costa dilatata incrassata fimbriata.

*Male.* Brown, pale buff beneath. Head pale buff. Antennæ thickly pubescent, slightly contorted at somewhat before one-fourth of the length. Thorax with four pale-buff stripes. Abdomen with a fawn-coloured apical tuft. Fore wings with a buff basal spot and with six more or less elongated discal spots; 3rd discal spot broader than the 1st and 2nd, much shorter than the 4th, which is lanceolate

and oblique; 5th subcostal, not one-third of the breadth of the 6th. Hind wings buff, with a very broad brown border; costa much dilated and incrassated, furnished beneath with a long recumbent fringe; underside with a brown transverse streak, which is somewhat darker than the border. Length of the body  $3\frac{1}{2}$  lines; of the wings 10 lines.

93. *LITHOSIA XYLINOIDES*, n. s. *Mas.* Cinerea, capite thoraceque fusciscenti-cinereis, alis albido fimbriatis, anticis acutis fusco conspersis fascia nigricante indistincta informi flexa lituraque discali nigra, posticis extus fusciscentibus. *Var.* Capite thoraceque magis fusciscentibus, alis anticis fusco saturatoribus fascia fusca distincta litura costali nigra nulla.

*Male.* Cinereous. Head and thorax pale-brownish cinereous. Antennæ minutely setulose. Abdomen extending beyond the hind wings, with an elongated compact apical tuft. Wings with a whitish fringe. Fore wings acute, irregularly brown-speckled, with an indistinct irregular bent blackish band, which forms a very distinct elongated black spot on the costa; costa and exterior border straight, the latter moderately oblique. Hind wings diffusely brownish exteriorly. Length of the body 5 lines; of the wings 11 lines. *Var.* Head and thorax more brownish. Fore wings much more speckled with brown; the band brown, more complete, not black on the costa. Hind wings wholly brown, excepting the cinereous fringe.

94. *LITHOSIA TORTRICOIDES*, n. s. *Fæm.* Pallide testaceo-cinerea, thorace et abdomine pallidissime murinis, alis anticis acutis fusco pallido subnebulosis, margine exteriore vix flexo. *Mas?* Testacea, alis brevioribus, anticis non nebulosis litura costali oblongo-quadrata obscure fusca litura apicali fusciscente venis costali et subcostali contiguis hac subtus fimbriata.

*Female.* Pale-testaceous cinereous. Thorax, except the sides and abdomen above, very pale mouse-colour, the latter hardly extending beyond the hind wings. Hind tibiae with very short spurs. Wings elongate. Fore wings acute, partly and indistinctly clouded with pale brown; costa hardly convex, with a darker distinct brown mark at a little beyond the middle; exterior border hardly bent in the middle. Hind wings much paler than the fore wings. Length of the body 4 lines; of the wings 14 lines.

*Male?* Testaceous. Palpi black towards the tips. Antennæ minutely setulose. Wings shorter than those of the female. Fore wings not clouded, but with a well-defined elongate quadrate dark-brown middle costal mark, and with a diffuse paler brown apical costal mark; costa dilated towards the base; costal vein and subcostal vein contiguous for some space, the former with a reversed fringe towards the base; discal areolet enlarged. Length of the body  $4\frac{1}{2}$  lines; of the wings 11 lines.

95. *LITHOSIA DISCALIS*, n. s. *Mas.* Testacea, antennis subsetulosis, abdominis fasciculo apicali compresso, alis anticis vix acutis litura discali gibba nigricante fasciculata.

*Male.* Testaceous, rather flat. Antennæ minutely setulose. Abdomen with a compressed apical tuft. Fore wings hardly acute, with a gibbous blackish tufted mark on the discal areolet, which is concave beneath; costa hardly convex; exterior border very oblique. Hind wings paler. Length of the body  $3\frac{1}{2}$  lines; of the wings 8 lines.

#### Gen. *BLAVIA*, n. g.

*Mas.* *Corpus* gracile. *Proboscis* subobsoleta. *Palpi* brevissimi. *Antennæ* breviusculæ, setulosæ. *Abdomen* alas posticas vix superans, fasciculo apicali parvo. *Pedes* graciles; femora sulcata; tibiæ posticæ calcaribus quatuor longiusculis approximatis. *Alæ* elongatæ; anticæ apice rectangulatæ, costa recta, margine exteriore subobliquo vix convexo.

*Male.* Body slender. *Proboscis* almost obsolete. *Palpi* very short. *Antennæ* rather short, distinctly setulose. *Abdomen* hardly extending beyond the hind wings; apical tuft small. *Legs* slender; femora furrowed; hind tibiæ with four rather long approximate spurs. *Wings* elongate, moderately broad. Fore wings rectangular at the tips; costa quite straight; exterior border hardly convex, slightly oblique; 2nd superior vein forked near the base; no 3rd or 4th inferior veins.

This genus, perhaps, may not belong to the *Lithosiidæ*.

96. *BLAVIA CALIGINOSA*, n. s. *Mas.* Nigro-fusca, subtus cinereo-fusca, alis cinereis margine exteriore fusco.

*Male.* Blackish brown, cinereous brown beneath; wings cinereous, brown towards the exterior border. Length of the body 3 lines; of the wings 8 lines.

#### Gen. *MANTALA*, n. g.

*Mas.* *Corpus* sat gracile. *Proboscis* distincta. *Palpi* porrecti, obtusi, frontem perpaullo superantes, articulis indistinctis. *Antennæ* setaceæ, compressæ, subserratæ, setulosæ, basi robustæ. *Abdomen* alas posticas non superans, fasciculo apicali parvo. *Pedes* sat validi; tibiæ posticæ quadricaratae. *Alæ* elongatæ; anticæ apice rotundatæ, areola discali fimbriata, costa vix convexa, margine exteriore sat obliquo.

*Male.* Body rather slender. *Proboscis* distinct. *Palpi* porrect, obtuse, extending very little beyond the front; joints indistinct. *Antennæ* setaceous, compressed, subserrate, setulose, stout towards the base. *Tegulæ* of the thorax furrowed. *Abdomen* not extending beyond the hind wings; apical tuft small. *Legs* rather stout; hind tibiæ with four moderately long spurs. *Wings* elongate, moderately

broad; fringe long. Fore wings rounded at the tips, thickly fringed or tufted about the discal areolet; costa hardly convex; exterior border rather oblique; 3rd superior and 4th inferior veins forked.

97. *MANTALA TINEOIDES*, n. s. *Mas.* Pallide fulva, alis anticis litura costali nigra elongata discum versus diffusa, venis apud areolam discalem margineque interiore fimbriatis.

*Male.* Pale tawny. Fore wings with a black elongate costal mark, which extends diffusely to the disk; the veins about the latter are furnished with a recumbent fringe, and the interior border is broadly fringed. Hind wings paler. Length of the body 3 lines; of the wings 10 lines.

Gen. *TEULISNA*, n. g.

*Mas.* *Corpus* crassum. *Proboscis* longiuscula. *Palpi* brevissimi. *Antennæ* subpubescentes. *Abdomen* alas posticas paullo superans, fasciculis lateralibus parvis, fasciculo apicali denso tumido. *Pedes* graciles; tibiæ posticæ quadricalcaratæ. *Alæ* anticæ apice rectangulatae, costa recta, margine exteriore postico subconcano, margine interiore extus excavato, angulo interiore producto subfalcato, areola discali subfasciculata.

*Male.* Body thick. *Proboscis* rather long. *Palpi* extremely short. *Antennæ* minutely pubescent. *Abdomen* extending a little beyond the hind wings, with minute tufts along each side, and with a thick tumid apical tuft. Legs slender; hind tibiæ with four moderately long spurs. Wings elongate, moderately broad. Fore wings rectangular at the tips; costa straight; exterior border slightly concave hindward; interior border excavated exteriorly; interior angle prominent, subfalcate; discal areolet slightly tufted above; four inferior veins distinct. Type *T. plagiata*.

98. *TEULISNA PLAGIATA*, n. s. *Mas.* Albida, testaceo subincta, subtus fuscescens, thorace abdomineque apicem versus nigricantibus, alis fuscescente marginatis, anticis nigricante bifasciatis fascia 1<sup>a</sup> latissima 2<sup>a</sup> interrupta.

*Male.* Whitish, with a slight testaceous tinge, mostly brownish beneath. Thorax blackish except in front. *Abdomen* blackish towards the tip. Wings broadly brownish-bordered. Fore wings with two blackish bands, which do not extend to the costa; 1st band very broad, protuberant on the inner side; 2nd narrower, irregular, interrupted, not extending to the hind border. Length of the body 4 lines; of the wings 12 lines.

99. *TEULISNA CHILOIDES*, n. s. *Fæm.* Cervina, alis anticis apud marginem interiorem fuscis fascia exteriore fuscescente dentata angulo interiore late fimbriato, posticis testaceis fascia marginali latissima fuscescente.

*Female.* Fawn-colour. *Antennæ* slender, hardly pubescent. *Abdomen*

not extending beyond the hind wings. Wings with a rather short fringe. Fore wings mostly brown along the interior border, with a less distinct brownish dentate exterior band; tips acutely rectangular, interior angle with a broad fringe less produced than in the preceding species. Hind wings testaceous, with a very broad brownish marginal band. Length of the body 4 lines; of the wings 14 lines.

Gen. TEGULATA, n. g.

*Mas.* *Corpus* sat robustum. *Proboscis* et *palpi* brevissimi. *Antennæ* subsetulosæ. *Thorax* tegulis longiusculis. *Abdomen* alas posticas paullo superans, fasciculo apicali parvo. *Pedes* subcompressi; *tibiæ* posticæ calcaribus quatuor breviusculis. *Alæ* elongatæ; anticæ costa basi excavata, apud medium dilatata.

*Male.* Body moderately stout. *Proboscis* and *palpi* very short. *Antennæ* very minutely setulose. *Thorax* with rather long tegulæ. *Abdomen* extending a little beyond the hind wings; apical tuft small. *Legs* bare, slightly compressed; hind *tibiæ* with four rather short spurs. *Wings* elongate, moderately broad. Fore wings rectangular at the tips; costa excavated towards the base, protuberant in the middle; exterior border hardly oblique, very slightly bent before the middle; four superior veins distinct, 2nd forked; two inferior veins; submedian vein well developed.

100. TEGULATA TUMIDA, n. s. *Mas.* Cervina, abdomine alisque posticis fusciscenti-cinereis, alis anticis apud marginem interiorem nigricantibus costa basali punctoque discali nigris.

*Male.* Fawn-colour; underside, abdomen, and hind wings brownish cinereous. Fore wings a little paler towards the base than elsewhere, blackish along the interior border, black along the excavated part of the costa; discal point black. Length of the body  $3\frac{1}{2}$  lines; of the wings 12 lines.

Gen. CORCURA, n. g.

*Mas.* *Corpus* robustum. *Proboscis* distincta. *Palpi* brevissimi. *Antennæ* setulosæ. *Thoracis* tegulæ longæ, sulcatæ. *Abdomen* breviusculum, fasciculo apicali maximo densissimo. *Tibiæ* posticæ calcaribus quatuor breviusculis. *Alæ* latiusculæ, vix elongatæ; anticæ apice subrotundatæ, costa basi subexcavata fimbriata, margine exteriori recto sat obliquo.

*Male.* Body robust. *Proboscis* distinct. *Palpi* extremely short. *Antennæ* distinctly setulose. Tegulæ of the thorax long, furrowed. *Abdomen* rather short, with an extremely large and thick apical tuft. *Legs* moderately stout; hind *tibiæ* with four rather short spurs. *Wings* rather broad, hardly elongate. Fore wings slightly rounded at the tips; costa slightly excavated, and with a recumbent thickly fringed border towards the base; exterior border straight, rather ob-

lique; discal areolet long, narrow, with a longitudinal crease; four superior veins; two inferior veins.

101. *CORCURA TORTA*, n. s. *Mas.* Ochraceo-cervina, abdomine lutescente fasciculo apicali nigricante, alis anticis costa basali albida nigro bimaculata, posticis pallide luteis.

*Male.* Ochraceous fawn-colour. Abdomen pale luteous; tuft blackish. Fore wings with the basal lappet whitish, containing an elongated black spot, and having another black spot at its tip; space along the exterior border slightly paler than the rest of the wing. Hind wings pale luteous. Length of the body 5 lines; of the wings 14 lines.

Gen. *LYCLENÉ*, *Moore*.

*Cyllene*, *Walk.*

102. *LYCLENÉ TRIFASCIA*, n. s. *Fæm.* Albida, nitens, latiuscula, palpis brevissimis articulo 3<sup>o</sup> distincto, thorace fascia purpureo-fusca, abdomine alisque posticis subtestaceis, alis anticis apice subrotundatis gutta basali fascisque tribus purpurascenti-fuscis.

*Female.* Whitish, shining, rather broad. Proboscis moderately long. Palpi slender, porrect, not extending beyond the front; 3rd joint distinct. Thorax with a purplish-brown band. Abdomen and hind wings with a slight testaceous tinge. Fore wings slightly rounded at the tips, with three purplish-brown bands, and with a basal dot of the same hue; 2nd band nearly interrupted in the middle; 3rd marginal, interrupted near the tip; exterior border very oblique. Length of the body 4 lines; of the wings 12 lines.

Allied to *L. transversa* in structure, but differing much from it in the bands of the fore wings.

103. *LYCLENÉ BIZONOIDES*, n. s. *Fæm.* Alba, sat lata, palpis subarcuatis frontem non superantibus, thorace fascia maculisque duabus ochraceis, alis anticis maculis tribus basalibus duabus discalibus quatuorque marginalibus lineisque tribus ochraceis, posticis subtus apice ochraceis.

*Female.* White, slightly shining, rather broad. Proboscis rather long. Palpi slender, slightly curved, not extending beyond the front. Thorax with an ochraceous band in front, and with an ochraceous spot on each shoulder. Fore wings hardly acute, with ochraceous marks; three basal spots; three irregular transverse lines, of which the first and the second are united in front; two elongated spots between the 2nd and 3rd lines, the hinder one connected with the 3rd line; four large marginal spots; fringe ochraceous; costa convex. Hind wings ochraceous at the tips beneath. Length of the body 3 lines; of the wings 10 lines.

104. *LYCLENÉ DIFFUSA*, n. s. *Fæm.* Alba, palpis porrectis caput non superantibus, tibiis posticis bicalcaratis, alis anticis fere omnino cer-

vinis e maculis confluentibus fimbria cervino guttata, posticis cervino submarginatis.

*Female.* White. Proboscis slender. Palpi porrect, straight, not extending beyond the head. Antennæ rather stout. Abdomen not extending beyond the hind wings. Legs rather stout; tibiæ with two fawn-coloured bands; hind tibiæ with two apical spurs. Fore wings somewhat rounded at the tips, with confluent fawn-coloured spots, which occupy nearly the whole surface, and extend to the costa and to the interior border, but not to the exterior border; costa slightly convex; exterior border convex, very oblique; fringe with fawn-coloured dots. Hind wings slightly bordered with fawn-colour. Length of the body 3 lines; of the wings 10 lines.

105. *LYCLENÉ IMPOSITA*, n. s. *Mas.* Alba, robusta, subtus lutescens, capite fascia viridi-nigra, thorace fasciis tribus nigro-viridibus, abdomine lutescente vittis tribus guttularibus nigricantibus, alis anticis lituris basalibus nigro-viridibus fasciis duabus fuscis 2<sup>a</sup> latissima albo interfasciata, posticis lutescentibus.

*Male.* White, stout, pale luteous beneath. Head testaceous, with a greenish-black band between the serrated and ciliated antennæ. Thorax with three macular greenish-black bands. Abdomen pale luteous, with three rows of blackish dots. Fore wings somewhat rounded at the tips, with two basal greenish-black marks (one on the costa), and with two brown bands; 1st band interior, much attenuated in front, dilated on the costa; 2nd extending to the exterior border, occupying much more than one-third of the surface of the wing, and including a diffuse and irregular white band; costa straight; exterior border rather oblique; fringe black-speckled. Hind wings pale luteous. Length of the body 4½ lines; of the wings 12 lines.

This may prove to be the male of *L. trifascia*.

106. *LYCLENÉ SEQUENS*, n. s. *Mas.* Alba, robusta, palpis porrectis caput non superantibus, capite thoraceque ochraceo notatis, abdomine apicem versus fusco, tibiæ posticarum calcaribus parvis approximatis, alis anticis lineis duabus transversis diffusis ochraceis.

*Male.* White, stout. Proboscis moderately long. Palpi porrect, not extending beyond the head. Antennæ setulose. Head and thorax with dull ochraceous marks. Abdomen extending a little beyond the hind wings, brown towards the tip, which is quadrate and thickly tufted. Hind tibiæ with four short and approximate spurs. Fore wings acute, with diffuse and irregular dull ochraceous transverse lines; these are partly macular; costa convex, slightly reflexed in the middle; exterior border very slightly oblique. Length of the body 3 lines; of the wings 7 lines.

This species much resembles *L. bizonoides*, but the markings are rather different.



107. *LYCENE CUNEIFERA*, n. s. *Mas.* Pallide lutea, crassa, palpis brevissimis, thorace guttis quatuor nigricantibus, abdominis dimidio apicali nigro-fusco, alis anticis guttis basalibus linea 1<sup>a</sup> undulata antice furcata linea 2<sup>a</sup> valde serpentina guttisque submarginalibus fuscis.

*Male.* Pale luteous, very robust. Palpi extremely short. Antennæ setulose, rather short. Thorax with two blackish dots on each side. Abdomen not extending beyond the hind wings; apical half blackish brown; tip quadrate, tufted. Legs hardly stout; hind tibiæ very slightly curved, with four moderately long spurs. Fore wings with brown markings; two basal points; interior line deeply undulating, forked in front, with two subcostal streaks near its outer branch; exterior line very oblique, most deeply winding; a row of submarginal dots, of which the hindward are elongated; costa convex, slightly reflexed in the middle; exterior border convex, rather oblique. Hind wings much paler. Length of the body 4 lines; of the wings 10 lines. This species and the following one are nearly allied to *L. undulosa*.

108. *LYCENE CUNEIGERA*, n. s. *Mas.* Pallide lutea, robusta, palpis caput vix superantibus articulo 3<sup>o</sup> minimo, abdomine fascia latissima nigro-fusca, alis anticis guttis basalibus lineis tribus variis lineaque submarginali valde serpentina nigricantibus, posticis fuscescenti-cinereis.

*Male.* Pale luteous, robust. Palpi extending very little beyond the head; 3rd joint extremely minute. Antennæ setulose. Thorax with a black point on each shoulder. Abdomen extending a little beyond the hind wings, blackish brown except towards the base and at the tip, which is quadrate and furnished with two large valves. Fore wings with blackish markings; seven dots near the base; two oblique lines before the middle; the 1st macular, abruptly retracted towards the costa; the 2nd emitting a subcostal streak by which it is connected with the exterior line, the latter resembling the line of the preceding species, except that its windings are less equal in length; submarginal dots like those of the preceding species; fringe brownish; costa hardly convex; tip rounded. Hind wings brownish cinereous. Length of the body 3 lines; of the wings 8 lines.

109. *LYCENE DISTRIBUTA*, n. s. *Mas.* Luteo-flava, sat robusta, palpis porrectis caput vix superantibus, abdominis fasciculo apicali sat magno, alis anticis strigis basalibus lineis duabus parallelis a striga connexis antice furcatis strigisque quinque marginalibus fuscis, posticis fascia submarginali fusca.

*Male.* Luteous yellow, moderately stout. Palpi porrect, slender, hardly extending beyond the head. Antennæ very minutely setulose. Abdomen not extending beyond the hind wings; apical tuft rather large. Fore wings with brown markings; four small basal streaks; two broad parallel lines, which are forked in front, and are united by an oblique hinder line, the outer one emitting five streaks to the exterior

border, which is very oblique; costa slightly convex. Hind wings paler, with a brown submarginal band. Length of the body  $2\frac{1}{2}$  lines; of the wings 7 lines.

110. *LYCLENÉ VAGILINEA*, n. s. *Mas.* Alba, capite thoraceque nigro guttatis, palpis porrectis, alis anticis lineis tribus strigis duabus basalibus una discali quatuorque submarginalibus nigro-fuscis.

*Male.* Pure white. Head with a blackish point on the vertex, and another on the front. Palpi porrect, not extending beyond the head. Antennæ very minutely setulose. Thorax with two black dots on each side. Abdomen extending very little beyond the hind wings, quadrate and tufted at the tip. Tarsi with black tips; fore tibiæ with a black band; hind tibiæ with four short spurs. Fore wings with blackish-brown markings, slightly acute; two basal, one discal, and four submarginal streaks; interior line curved outward; middle line undulating, connected in the disk with the interior line; exterior line much more deeply bent, connected with the middle line on the costa and approaching it in the hinder curve; costa hardly convex; exterior border very oblique. Length of the body 3 lines; of the wings 8 lines.

111. *LYCLENÉ TURBIDA*, n. s. *Mas.* Cinereo-cervina, crassa, palpis porrectis gracillimis, abdomine conico, alis anticis fusciscente conspersis apice subrotundatis, posticis cinerascensibus.

*Male.* Cinereous fawn-colour, robust. Head and thorax broad. Palpi porrect, very slender, not extending beyond the head. Antennæ minutely setulose. Abdomen conical, extending a little beyond the hind wings; apical tuft small. Legs bare; hind tibiæ with four long spurs. Four wings thickly but minutely and indistinctly brownish-speckled; costa hardly convex; tips slightly rounded; exterior border straight, moderately oblique. Hind wings more cinereous. Length of the body 3 lines; of the wings 7 lines.

112. *LYCLENÉ CRASSA*, n. s. *Mas.* Cervina, crassa, palpis porrectis lanceolatis, abdomine conico, alis breviusculis latis, anticis fusco bifasciatis, posticis subcinerascensibus.

*Male.* Fawn-colour, robust. Head and thorax very broad. Palpi porrect, lanceolate, hardly extending beyond the head. Antennæ very minutely setulose. Abdomen conical, extending a little beyond the hind wings; apical tuft small. Hind tibiæ with four long spurs. Wings short and broad. Fore wings slightly rounded at the tips, with two indistinct diffuse brown bands, one near the base, the other exterior, more oblique; costa convex; exterior border slightly oblique. Hind wings a little paler and with a cinereous tinge. Length of the body  $3\frac{1}{2}$  lines; of the wings 8 lines.

113. *LYCLENÉ STRIGICOSTA*, n. s. *Mas.* Pallide cervina, sat gracilis, palpis porrectis linearibus articulo 3<sup>o</sup> obtuso minimo, tibiarum posti-

carum calcaribus quatuor longissimis, alis anticis puncto basali lituris quatuor costalibus gutta discali strigaeque marginali nigris.

*Male.* Pale fawn-colour, rather slender. Abdomen, hind wings, and middle part of fore wings more cinereous. Palpi porrect, linear, extending a little beyond the head; 3rd joint obtuse, very minute. Antennæ short, stout, setulose. Abdomen extending very little beyond the hind wings; apical tuft very small. Hind tibiæ with four very long spurs. Wings moderately broad. Fore wings acute, with a black basal point, and with four black shaded costal marks, of which the third emits an oblique streak to the irregular black discal dot; costa slightly convex; a short black streak on the very oblique exterior border; fringe with a black line which is interrupted opposite each vein. Length of the body 3 lines; of the wings 8 lines.

114. *LYCLENÉ TINEOIDES*, n. s. *Fæm.* Cinereo-fusca, robusta, capite thoraceque antico pallide testaceis, palpis lanceolatis subascendentibus, antennis breviusculis, alis anticis angustis rotundatis guttis duabus discalibus nigris strigis apicalibus testaceis.

*Female.* Cinereous brown, stout. Head and fore part of the thorax dull pale testaceous. Palpi lanceolate, slightly ascending, extending very little beyond the head; 3rd joint elongate. Antennæ rather short. Abdomen extending a little beyond the hind wings. Hind tibiæ with four long spurs. Wings elongate, rather narrow. Fore wings rounded at the tips, with testaceous irregular apical streaks; two black points in a line on the disk, one at one-fourth of the length, the other beyond the middle; costa hardly convex; exterior border very oblique. Hind wings and abdomen brownish cinereous. Length of the body 3 lines; of the wings 9 lines.

This species, like some others included under *Lyclene*, differs much from the typical structure of that genus; but the separation of it under another generic name may be deferred until some new cognate species are discovered.

115. *LYCLENÉ BIPUNCTATA*, n. s. *Mas.* Cinerea, crassa, capite fascia cyaneo-nigra, palpis lanceolatis oblique ascendentibus, thorace guttis decem cyaneo-nigris, abdomine e guttis fusciscentibus bivittato, alis anticis guttis basalibus cyaneo-nigris, litura costali lineisque duabus obliquis subparallelis purpureo-fuscis, posticis pallide flavis.

*Male.* Cinereous, very stout; nearly allied to *L. imposita*. Head and thorax very broad, the former bluish black between the antennæ. Palpi straight, lanceolate, obliquely ascending, not near extending to the front; 3rd joint not more than one-fourth of the length of the 2nd. Antennæ setulose. Thorax with ten bluish-black dots. Abdomen pale yellow, tapering, hardly extending beyond the hind wings, with two rows of brownish dots; apical tuft small. Legs stout; hind tibiæ with four moderately long spurs; fore femora and fore tibiæ mostly black above; middle tibiæ black towards the tips. Fore wings rounded

at the tips, thickly blackish-speckled, with bluish-black basal dots, with a purplish-brown basal costal mark, and with two oblique nearly parallel lines of the same hue; these are diffuse on the outer side, and the 2nd is bent hindward; submarginal line and marks on the fringe also purplish brown, the former interrupted and distorted; costa and exterior border straight, the latter rather oblique. Hind wings pale yellow. Length of the body 4 lines; of the wings 10 lines.

116. *LYCLENÉ VAGIGUTTA*, n. s. *Mas.* Pallide testacea, lata, palpis nigris lanceolatis minimis, tibiæ posticarum calcaribus quatuor longissimis, alis anticis apice subrotundatis fasciis quatuor guttularibus nigris.

*Male.* Pale dull testaceous, broad, robust. Palpi black, lanceolate, porrect, very small, not extending beyond the head. Antennæ minutely setulose. Abdomen extending beyond the hind wings; apical tuft small, smooth. Legs stout; hind tibiæ with four very long spurs. Wings moderately broad. Fore wings somewhat rounded at the tips, with twelve irregular black dots, which form four bands; costa very slightly convex; exterior border slightly convex and oblique. Length of the body  $3\frac{1}{2}$  lines; of the wings 8 lines.

117. *LYCLENÉ ATRIGUTTA*, n. s. *Fæm.* Subcervino-alba, palpis latis subarcuatis articulo 3<sup>o</sup> subobsoleto, alis elongatis non latis subtus cinereis, alis anticis apice rotundatis atro duodecimguttatis.

*Female.* White, moderately stout, with a very pale fawn-coloured tinge. Front rather prominent. Palpi broad, linear, very slightly curved, extending beyond the head; 3rd joint almost obsolete. Abdomen extending a little beyond the hind wings. Legs slender; hind tibiæ with four long spurs. Wings elongate, not broad, cinereous beneath. Fore wings rounded at the tips, white about the deep-black dots, and with an irregular angular transverse white line; six dots on the costa, three on the exterior border, and three on the disk, two of these on the line; costa straight; exterior border very oblique. Length of the body 3 lines; of the wings 9 lines.

#### Gen. CHUNDANA, n. g.

*Mas.* *Corpus* sat gracile. *Proboscis* obsoleta. *Palpi* brevissimi, gracillimi. *Antennæ* breves, glabræ, robustæ, subcompressæ. *Abdomen* valvulis apicalibus longiusculis. *Pedes* graciles; tibiæ posticæ sat validæ, calcaribus quatuor longissimis. *Alæ* anticæ apice rectangulatæ, margine exteriori postico obliquo; posticæ margine exteriori subexcavato.

*Male.* Body rather slender. *Proboscis* obsolete. Palpi extremely short and slender, not extending in front of the head. Antennæ short, stout, smooth, slightly compressed. Abdomen not extending beyond the hind wings, furnished with two smoothly pilose rather long apical valves. Legs slender; hind tibiæ rather stout, with four very long

spurs. Wings moderately broad. Fore wings rectangular at the tips; costa straight; exterior border oblique hindward; 2nd inferior vein near the 1st, very remote from the 3rd. Hind wings with the exterior border very slightly excavated in the middle.

118. *CHUNDANA LUGUBRIS*, n. s. *Mas.* Cinerea, vertice albido, fronte fusca, alis anticis linea interiore guttulari guttaque submarginali nigricantibus, anticis lituris costalibus et fimbrialibus nigricantibus plaga basali vesiculari subhyalina.

*Male.* Cinereous, with a brownish tinge beneath. Vertex whitish; front dark brown, very oblique. Wings with an interior transverse line of blackish dots, and with a larger blackish dot near the middle of the exterior border. Fore wings with some blackish marks along the costa and on the fringe; a vesicular nearly hyaline space near the base, traversed by the 4th inferior vein. Length of the body  $2\frac{1}{2}$  lines; of the wings 7 lines.

Gen. *LIGIDIA*, n. g.

*Mas.* *Corpus* sat robustum. *Proboscis* brevissima. *Palpi* porrecti, caput superantes; articulus 2<sup>us</sup> latus, linearis, obtusus; 3<sup>us</sup> minimus. *Antennæ* breviusculæ, subpubescentes. *Abdomen* fasciculo apicali compresso minimo. *Pedes* graciles; tibiæ posticæ calcaribus quatuor longissimis. *Alæ* anticæ apice rectangulatæ, costa recta, margine exteriore convexo.

*Male.* Body moderately stout. Front prominent. Proboscis very short. Palpi porrect, extending somewhat beyond the head; 2nd joint broad linear, obtuse at the tip; 3rd extremely minute. Antennæ rather short, minutely pubescent. Abdomen not extending beyond the hind wings; apical tuft compressed, very small. Legs slender; hind tibiæ with four very long spurs. Wings moderately broad. Fore wings rectangular at the tips; costa straight; exterior border convex, moderately oblique.

This genus perhaps does not belong to the *Lithosiidæ*; it has some resemblance to the *Crambidæ*.

119. *LIGIDIA DECISISSIMA*, n. s. *Mas.* Lateritia, abdomine alisque posticis rufescenti-cinereis, alis punctis marginalibus nigris, anticis lituris costalibus lituraque una fimbriali nigris.

*Male.* Brick-red. Abdomen and hind wings cinereous, with a slight reddish tinge. Wings with minute black marginal points. Fore wings with some black marks on the exterior part of the costa, and with one black mark on the middle of the fringe. Length of the body 3 lines; of the wings 7 lines.

Gen. *PISARA*, n. g.

*Mas.* *Corpus* robustum, squamosum. *Proboscis* brevissima. *Palpi* angulati, caput sat superantes; articulus 2<sup>us</sup> porrectus, latissimus,

pilosus; 3<sup>us</sup> gracilis, linearis, brevissimus. *Antennæ* subsetulosæ, scapo crasso. *Abdomen* fasciculo apicali parvo. *Pedes* robusti; tibiæ posticæ calcaribus quatuor longis. *Alæ* anticæ squamosæ, scabræ, apice subrotundatæ.

*Male.* Body stout, squamous. Proboscis very short. Palpi extending rather far beyond the head; 2nd joint porrect, pilose, very broad; 3rd decumbent, linear, slender, not more than one-fourth of the length of the 2nd, with which it forms an angle. *Antennæ* minutely setulose; basal joint very stout. *Abdomen* not extending beyond the hind wings; apical tuft small. Legs stout; hind tibiæ with four long spurs. Wings squamous, moderately broad. Fore wings slightly rounded at the tips, with some elevated scales on the disk; costa slightly convex; exterior border nearly straight, rather oblique.

120. *PISARA OPALINA*, n. s. *Mas.* Cinerea, opalina, thorace antico fusciscente, alis basi fusciscentibus squamoso-scabris nigricante lineatis linea 1<sup>a</sup> subarcuata 2<sup>a</sup> punctulari 3<sup>a</sup> subundulata linea submarginali fusca recta.

*Male.* Cinereous, shining, with pearly reflections. Head white above. Thorax brownish in front. Wings with the fringe long and full. Fore wings partly and diffusely brownish near the base; lines blackish; interior line slightly curved outward, rather diffuse; exterior line also curved, composed of black points; 3rd line slightly undulating; submarginal line brown, straight, very near the border; a scabrous line from the base nearly to the middle, formed by three clusters of elevated scales. Length of the body 4 lines; of the wings 9 lines.

121. *PISARA?* ACONTIOIDES, n. s. *Fæm.* Alba, abdomine conico, alis anticis dimidio basali antico cinereo-fusco squamis chalybeis linea exteriore subundulata e guttis tumidis chalybeis spatio marginali cinereo-fusco, posticis subcinereis.

*Female.* White. Head wanting. *Abdomen* conical. Fore wings with the fore half from the base to half the length cinereous brown, adorned with chalybeous spangles; an exterior slightly undulating line composed of chalybeous tumid dots; marginal space cinereous brown. Hind wings slightly cinereous. Length of the body 3½ lines; of the wings 8 lines.

#### Gen. ETANNA, n. g.

*Fæm.* *Corpus* robustum. *Proboscis* distincta. *Palpi* validi, oblique ascendentes, caput sat superantes; articulus 3<sup>us</sup> linearis, 2<sup>o</sup> vix brevior. *Antennæ* robustæ. *Abdomen* alas posticas non superans. *Pedes* validi; tibiæ posticæ quadricaratae. *Alæ* non longæ; apice subquadratae, costa vix convexa, margine exteriore vix obliquo.

*Female.* Body stout. Proboscis distinct. Palpi stout, obliquely ascending, extending rather far beyond the head; 3rd joint linear, rounded at the tip, nearly as long and as broad as the 2nd. *Antennæ* stout.

Abdomen not extending beyond the hind wings. Legs stout; middle tibiæ with two spurs, one of them more than twice the length of the other; hind tibiæ with four long spurs. Wings moderately broad, not long. Fore wings subquadrate at the tips; costa hardly convex; exterior border hardly oblique; 3rd inferior vein a little nearer to the 2nd than to the 4th. Type *E. basalis*.

This genus has some resemblance to the *Tortricites*.

122. *ETANNA BASALIS*, n. s. *Fœm.* Albida, viridi tincta, abdomine alisque posticis cinereo-albidis, alis anticis dimidio apicali albo plaga basali nigro-fusca spatio apicali viridescente nebulas fuscas strigamque rufescentem latam diffusam lineasque duas transversas albas marginatas includente.

*Female.* Whitish, tinged with green. Abdomen and hind wings cinereous whitish. Fore wings white for half the length from the base, near which there is a blackish-brown patch; apical half greenish, partly clouded with brown, containing a broad diffuse reddish streak, and traversed by two whitish black-bordered lines; 1st line much and irregularly curved outward; 2nd zigzag, less distinct, abbreviated at each end. Length of the body 3 lines; of the wings 8 lines.

123. *ETANNA ERASTIOIDES*, n. s. *Fœm.* Cinerea, palporum articulo 3<sup>o</sup> lanceolato, alis anticis basi plagaque costali media cervinis spatio marginali fuscescanti-cinereo lineis interiore et exteriori nigris angulis spatio adhuc exteriori albido punctis marginalibus nigris posticis fuscescanti-cinereis.

*Female.* Cinereous. Palpi stout, obliquely ascending; 3rd joint lanceolate, much shorter than the 2nd. Wings with the fringe long and full. Fore wings fawn-colour at the base, and with a fawn-coloured patch on the middle of the costa; space along the exterior border brownish cinereous, this hue much attenuated hindward; interior and exterior lines black, slender, the latter much more zigzag than the former, and adjoining a more exterior whitish space; marginal points black, minute. Hind wings brownish cinereous, without markings. Length of the body 3 lines; of the wings 7 lines.

124. *ETANNA FLORIDA*, n. s. *Fœm.* Cinerea, alis anticis basi cervinis fasciaque media informi; interrupta spatio marginali fuscescanti-cinereo; lineis interiore et exteriori deviis denticulatis punctisque marginalibus nigris; margine exteriori postico obliquo; alis posticis lituris nullis.

*Female.* Cinereous, robust. Palpi stout, obliquely ascending; 3rd joint linear, rounded at the tip, much shorter than the 2nd. Fore wings fawn-coloured at the base, and with an interrupted irregular fawn-coloured middle band; space along the exterior border diffusely brownish cinereous; interior and exterior lines black, slight, irregular, denticulated; marginal points black; tips rectangular; hind part of the exterior border oblique. Hind wings without markings. Length of the body 4½ lines; of the wings 11 lines.

Gen. BIZONE, *Walk.*

125. *Bizone perornata*, *Walk. Cat. Lep.* 1st ser. 548.

Inhabits also Hindostan and Java.

126. *BIZONE DETERMINATA*, n. s. *Fœm.* Alba, thorace fasciis rufescenti-ochraceis, alis elongatis non latis rufescenti-ochraceo quadrifasciatis fasciis 2<sup>a</sup> et 3<sup>a</sup> concisis rectis nigro marginatis guttis duabus discalibus nigris, posticis rufescente subinctis.

*Female.* White. Thorax with reddish-ochraceous bands. Wings elongate, rather narrow. Fore wings with four reddish-ochraceous bands; 1st band very near the base; 2nd and 3rd concise, straight, upright, broadly bordered with black, the 2nd on the inner side, the 3rd on the outer side; 4th marginal; two black dots in a longitudinal line between the 2nd and 3rd bands. Hind wings with a slight reddish tinge, except near the base and along the interior border. Length of the body 5 lines; of the wings 16 lines.

Nearest to *B. hamata*.

127. *BIZONE PUDENS*, n. s. *Mas.* Alba, thorace fasciis tribus miniatis, alis anticis miniato quadrifasciatis fasciis 2<sup>a</sup> furcata 3<sup>a</sup>que connexis striga discali furcata subobliqua, posticis roseo subinctis.

*Male.* White. Thorax with three red-lead bands. Fore wings with four slender red-lead bands; 1st band near the base, curved inward; 2nd nearly straight; 3rd forked in front, the outer fork connected with the 4th, which is marginal and is dentate on the inner side; a furcate slightly oblique discal streak, in front of which the wing is slightly tumid. Hind wings with a slight rosy tinge, which is most prevalent along the exterior border. Length of the body 3½ lines; of the wings 8 lines.

128. *BIZONE INCONCLUSA*, n. s. *Mas.* Alba, thorace fasciis tribus tegulisque ochraceis, alis anticis ochraceo quadrifasciatis fascia 2<sup>a</sup> strigam emittente gutta punctoque discalibus nigris fimbria costali reflexa ochraceo notata, posticis flavescente subinctis.

*Male.* White. Palpi and antennæ ochraceous. Thorax with three ochraceous bands; tegulæ ochraceous. Abdomen with a slight testaceous tinge. Legs with ochraceous bands. Fore wings with four ochraceous bands; 1st, 2nd, and 3rd angular; 4th marginal, paler; a black dot between the 2nd and 3rd bands, contiguous to a streak which is emitted by the 2nd band; an indistinct black point behind the black dot; a recumbent costal fringe between the 2nd and 3rd bands, marked with ochraceous. Hind wings with a very slight yellowish tinge. Length of the body 6 lines; of the wings 12 lines.

129. *BIZONE CONCLUSA*, n. s. *Mas.* Alba, thorace fasciis tribus tegulisque ochraceis, alis anticis ochraceo quadrifasciatis fascia 2<sup>a</sup> strigam emittente 3<sup>a</sup> subundulata fimbria costali reflexa ochraceo binotata, posticis subflavescentibus.



*Male.* White. Palpi and antennæ ochraceous. Thorax with three ochraceous bands; tegulæ ochraceous. Abdomen whitish, testaceous towards the tip, which has a large tuft. Legs with ochraceous bands. Fore wings with four ochraceous bands; 1st near the base, rather irregular; 2nd broader, emitting a broad streak to two black dots, one of which is behind the other; 3rd band slightly undulating; costa with a recumbent fringe, which extends from the 2nd to beyond the 3rd band, and is marked with ochraceous opposite these bands. Hind wings tinged with pale yellow; interior border thickly and deeply fringed. Length of the body 8 lines; of the wings 18 lines.

This species may be distinguished from the preceding one by its stouter form, the broader and differently formed bands of the fore wings, by the difference in the discal dots, and by the longer costal fringe.

130. *BIZONE COSTIFIMBRIA*, n. s. *Mas.* Alba, thorace fasciis tribus tegulisque ochraceis, alis anticis ochraceo quadrifasciatis fascia 1<sup>a</sup> strigam emittente 2<sup>a</sup> divisa 3<sup>a</sup> abbreviata nigro marginata fimbria costali reflexa longa ochracea albo binotata, posticis ochraceo subinctis.

*Male.* White. Palpi and antennæ ochraceous. Thorax with three ochraceous bands; tegulæ ochraceous. Abdomen ochraceous at the tip. Legs with ochraceous bands. Fore wings with four ochraceous bands; 1st band near the base, emitting a streak to the 2nd, which consists of two parts; 1st part forming a widened continuation of the streak; 2nd part clothed with long hairs, extending obliquely to the costal fringe; 3rd band broad, abbreviated in front, blackish-bordered on the outer side; 4th broad, marginal; recumbent costal fringe ochraceous, extending from the 1st to the 4th, with two white bands, of which the 2nd is abbreviated hindward. Hind wings slightly tinged with ochraceous, which hue is most prevalent towards the tips. Length of the body 6 lines; of the wings 16 lines.

This differs more from the two preceding species than the latter do from each other; but the three form a distinct group in the genus.

#### Gen. CHAMAITA, n. g.

*Mas.* Corpus sat gracile, sparse pilosum. Proboscis gracilis, longiuscula. Palpi non conspicui. Antennæ subsetulosæ, gracillimæ; articulus basalis robustus, longissimus. Tibiæ posticæ calcaribus quatuor brevissimis. Alæ oblongæ, subnudæ, subhyalinæ, apice rotundatæ; anticæ costa convexa.

*Male.* Body moderately slender, very thinly clothed. Proboscis slender, rather long. Palpi obsolete, or nearly so. Antennæ very minutely setulose, very slender, excepting the basal joint, which is stout and very long. Abdomen not extending beyond the hind wings. Legs moderately stout; hind tibiæ with four very short spurs. Wings oblong, almost bare and hyaline, rounded at the tips. Fore wings convex along the costa; exterior border slightly convex, rather

oblique; 4th superior vein very far from the others, which are approximate; 3rd inferior vein about twice as far from the 4th as from the 2nd; 2nd a little nearer to the 1st than to the 3rd. Hind wings with one superior vein.

This genus has a very peculiar structure; it has some resemblance to *Nudaria*, but its affinities are uncertain. Type *C. trichopteroides*.

131. CHAMAITA TRICHOPTEROIDES, n. s. *Mas.* Cinerca, antennis albidis, alis fere hyalinis vix pubescentibus.

*Male.* Cinereous. Antennæ whitish. Wings nearly hyaline, with thin and very short pubescence; veins pale. Fore wings with the costa pubescent. Length of the body 3 lines; of the wings 10 lines.

132. CHAMAITA CRASSICORNIS, n. s. *Mas.* Alba, palpis porrectis brevissimis, antennis robustis subsetulosis basi crassis, alis fere hyalinis vix pubescentibus.

*Male.* White. Palpi porrect, very short. Antennæ stout, minutely setulose; basal joint thick, rather long. Abdomen with two long apical valves. Legs stout; hind tibiæ with four rather short spurs. Wings nearly bare and hyaline; veins white. Length of the body  $2\frac{1}{2}$  lines; of the wings 7 lines.

#### Fam. ARCTIDÆ, *Leach.*

##### Gen. ARCTIA, *Schrank.*

133. *Arctia strigatula*, *Walk. Cat. Lep.* 1st ser. 613.

##### Gen. AREAS, *Walk.*

134. *Areas orientalis*, *Walk. Cat. Lep.* 1st ser. 658.

Inhabits also Hindostan and Java.

##### Gen. NUMENES, *Walk.*

This genus has perhaps more affinities with the *Drepanulidæ* and with the *Bombycidæ* than with the *Arctiidæ*, but hardly accords with any of the families of the Bombycites.

135. NUMENES CONTRAHENS, n. s. *Mas.* Testacea, capite thorace pedibusque anterioribus fuscis, alis anticis vitta postica fascisque duabus fuscis, posticis luteis fascia marginali fusca.

*Male.* Testaceous. Head, thorax, and anterior legs brown, hirsute. Proboscis obsolete. Palpi porrect, stout, short, pilose. Antennæ short, very deeply pectinated. Abdomen, hind legs, and hind wings pale luteous. Wings ample. Fore wings slightly acuminate, with a brown stripe along the interior border, and with two brown parallel and nearly upright bands; 2nd band irregularly double except in front. Hind wings with a brown marginal band, which is irregularly excavated in front. Length of the body 7 lines; of the wings 18 lines.

This is quite distinct from the typical species, *N. Siletti*, which it much resembles in colouring and in markings.

## [Gen. SCARPONA, n. g.

*Mas. Corpus robustum. Proboscis obsoleta. Palpi porrecti, breves, validi, obtusi. Antennæ latissime pectinatæ. Abdomen sat depressum, alas posticas non superans, fasciculo apicali nullo. Pedes validi, brevisseculi; tibiæ posticæ quadricalcaratæ. Alæ latæ, elongatæ; anticæ subfalcatæ, margine exteriori subangulato; posticæ margine exteriori postico subexcavato.*

*Male. Body stout. Proboscis obsolete. Palpi porrect, short, stout, obtuse; 3rd joint small. Antennæ very broadly pectinated. Abdomen rather broad and flat, not extending beyond the hind wings; no apical tuft. Legs stout, rather short; hind tibiæ with four stout moderately long spurs. Wings broad, elongate. Fore wings subfalcate; costa almost straight; exterior border slightly angular in the middle; 3rd inferior vein more than twice as far from the 4th as from the 2nd. Hind wings with the exterior border slightly excavated hindward.*

This genus is nearly allied to the preceding one, and also has some resemblance to the *Drepanulidæ*.

136. SCARPONA ENNOMOIDES, n.s. *Mas. Sulphurea, alis anticis fimbria fusca macula marginali cervina, posticis fimbria apud angulum interiorem fusca.*

*Male. Sulphur-yellow. Fore wings with a brown fringe, and with a fawn-coloured marginal spot in front of the angle of the exterior border. Hind wings with the fringe brown towards the interior angle. Length of the body 7 lines; of the wings 18 lines.*

## Gen. SPILOSOMA, Steph.

137. *Spilosoma transiens, Walk. Cat. Lep. Het. 1st ser. 675.*

Inhabits also Hindostan and Celebes.

## Gen. CERASANA, n. g.

*Mas. Corpus robustum, dense vestitum. Proboscis obsoleta. Palpi porrecti, breves, robusti, pilosi. Antennæ pectinatæ, longiusculæ. Abdomen cylindricum, lanuginosum, alas posticas paullo superans. Pedes breves, pilosi. Alæ elongatæ, spissæ; anticæ apice obtusæ, margine exteriori subflexo.*

*Male. Body thick, densely clothed. Proboscis obsolete. Palpi porrect, short, stout, pilose. Antennæ rather long, moderately pectinated. Abdomen cylindrical, lanuginous, extending a little beyond the hind wings. Legs short, pilose. Wings elongate, thick. Fore wings somewhat obtuse at the tips; costa hardly convex; exterior border slightly bent in the middle, very oblique hindward; veins in structure much like those of *Spilosoma*.*

138. CERASANA ANCEPS, n.s. *Mas. Pallidissime cervina, capite*

macula guttisque duabus nigris, thorace maculis tribus anticis nigris, abdomine e maculis nigris bivittato, alis sublineatis, anticis basi nigro guttatis.

*Male.* Very pale fawn-colour. Head with a black spot above, and with a black dot at the base of each antenna. Palpi black at the base. Thorax with three black dots in front. Abdomen with two rows of black spots, luteous and densely ferruginous towards the tip. Wings with several pale indistinct oblique undulating lines. Fore wings with some black dots at the base and along the basal half of the costa; exterior border with some brownish dots. Length of the body 10 lines; of the wings 26 lines.

Gen. SALIOCLETA, n. g.

*Mas.* Corpus robustum. Proboscis obsoleta. Palpi porrecti, breves, graciles, caput non superantes. Antennæ glabræ, longiusculæ, sat graciles. Abdomen conicum, alas posticas paullo superans, apicem versus subcompressum. Pedes breves, pilosi; tibiæ posticæ quadricalcaratæ. Alæ longæ; anticæ acutæ.

*Male.* Body thick. Proboscis obsolete. Palpi porrect, short, slender, not extending beyond the head; 3rd joint very minute. Antennæ smooth, rather long and slender. Abdomen conical, extending a little beyond the hind wings, slightly compressed towards the tip, which is subquadrate. Legs short, moderately stout; femora and tibiæ clothed with long hairs; hind tibiæ with four stout approximate moderately long spurs. Wings long, moderately broad. Fore wings acute; costa and exterior border straight, the latter extremely oblique; veins in structure much like those of *Spilosoma*. Hind wings with the exterior border convex.

Allied to *Zana*.

139. SALIOCLETA NONAGRIOIDES, n. s. *Mas.* Pallide lignicolor, alis anticis strigis diffusis pallide rufescentibus, posticis pallide rufescentibus.

*Male.* Pale wood-colour. Fore wings diffusedly streaked with pale dull reddish. Hind wings pale reddish, except along the costa. Length of the body 11 lines; of the wings 26 lines.

Fam. LIPARIDÆ, Steph.

Gen. ORGYIA, Ochs.

140. ORGYIA NIGROCROCEA, n. s. *Mas.* Ochracea, abdomine alisque posticis nigro-fuscis, alis anticis fascia latissima nigro-fusca antice abbreviata.

*Male.* Ochraceous, Abdomen and hind wings blackish brown. Fore wings with a very broad minutely speckled blackish-brown band, which extends to the exterior border hindward, and is diffuse and abbrevi-

viated towards the costa; under side blackish brown, with the exception of the costa and the tips. Length of the body  $3\frac{1}{2}$  lines; of the wings 11 lines.

141. *ORGYIA NEBULOSA*, n. s. *Mas.* Ferrugineo-fusca, alis anticis fusco obscuriore nebulosis lineis tribus dentatis nigris 2<sup>a</sup> intus albido marginata linea 4<sup>a</sup> submarginali e lunulis nigricantibus.

*Male.* Ferruginous brown, cinereous brown beneath. Palpi porrect, pilose, obtuse. Antennæ with very long pubescent branches. Fore wings clouded with darker brown on the disk; interior, middle, and exterior lines blackish dentate; the 2nd whitish-bordered on the inner side; submarginal line composed of blackish lunules. Length of the body  $3\frac{1}{2}$  lines; of the wings 10 lines,

142. *ORGYIA OSSEATA*, n. s. *Mas.* Fusca, alis anticis purpurascente tinctis lineis tribus nigricantibus deviis cinereo marginatis linea 4<sup>a</sup> submarginali e lunulis nigricantibus litura discali obliqua fusco strigata venisque subcostalibus albido-cinereis.

*Male.* Brown. Palpi broad, pilose, obtuse. Antennæ with very long pubescent branches. Fore wings purplish-tinged, with three blackish irregular cinereous-bordered lines; 4th or submarginal line more distinct, composed of blackish lunules; veins towards the costa whitish cinereous; a large oblique discal mark of the same hue including two interrupted black and brown streaks; a white streak by the interior angle. Length of the body  $4\frac{1}{2}$  lines; of the wings 11 lines.

143. *ORGYIA DIMIDIATA*, n. s. *Mas.* Cinereo-fusca, alis anticis lineis transversis obscurioribus undulatis indistinctis basi dimidioque costali ochraceis.

*Male.* Cinereous brown. Palpi porrect, obtuse. Antennæ with very long pubescent branches. Fore wings with indistinct darker undulating transverse lines; base and costal half ochraceous; outline of the latter hue jagged. Length of the body  $3\frac{1}{2}$  lines; of the wings 9 lines.

144. *ORGYIA VARIA*, n. s. *Mas.* Ferrugineo-fusca, alis anticis nigro subconsenspersis lineis duabus albidis undulatis striga apicali lutescente striga marginali alba, posticis cinereo-fuscis luteo marginatis.

*Male.* Ferruginous brown. Palpi porrect, rather slender, extending somewhat beyond the head. Antennæ short, with very long pubescent branches. Fore wings thinly black-speckled, with two whitish lines, of which the 2nd is much more undulating than the 1st; a pale luteous apical streak, behind which there is a small elongated white mark. Hind wings cinereous brown, with a broad pale luteous marginal band. Length of the body 4 lines; of the wings 10 lines.

#### Gen. *ARTAXA*, *Walk.*

145. *ARTAXA SIGNIPLAGA*, n. s. *Mas.* Pallide lutea, thorace postico

abdomineque basi fuscescentibus, alis anticis fuscis costa lutescente macula atra apud angulum anteriorem, posticis albidis.

*Male.* Pale luteous. Antennæ very broadly pectinated. Thorax brownish hindward. Abdomen hoary, brownish at the base. Fore wings brown, with the exception of the costa, for almost one-third of the length from the base, and with a deep-black large round spot by the interior angle. Hind wings whitish. Length of the body  $3\frac{1}{2}$  lines; of the wings 10 lines.

146. *ARTAXA METALEUCA*, n. s. *Mas.* Pallidissime cervina, alis anticis gutta subapicali nigricante linea submarginali e punctis nigricantibus vitta postica lata alba.

*Male.* Very pale fawn-colour. Head and palpi white; the latter porrect, with rounded tips; 3rd joint extremely minute. Fore wings with a blackish dot near the tip of the costa, and with some slight indications of a submarginal blackish line; a broad white stripe along the interior border. Length of the body 4 lines; of the wings 10 lines.

147. *ARTAXA? RUPTATA*, n. s. *Mas.* Pallide flavescens, alis anticis fusco conspersis, linea exteriori bis interrupta e atomis fuscis disco subtus fusco.

*Male.* Pale yellowish. Palpi decumbent, rather slender. Antennæ broadly pectinated. Fore wings thinly brown-speckled; some of the speckles confluent, and forming an exterior line, which is widely interrupted in two parts, and is dilated and most apparent on the costa; underside brown, with the exception of the exterior and interior borders. Hind wings slightly paler. Length of the body 3 lines; of the wings 8 lines.

This and the preceding species differ somewhat in the structure of the palpi from the typical form of *Artaxa*.

#### Gen. *LACIDA*, *Walk.*

148. *LACIDA COSTIPLAGA*, n. s. *Mas.* Fusca, thoracis lateribus nigricantibus, abdomine cristis nigris, alis anticis plaga strigaeque exteriori costalibus nigricantibus lineis exterioribus quatuor angulosis nigris fimbria nigricante notata.

*Male.* Brown. Palpi blackish, extremely broad, densely pilose. Antennæ with very long pubescent branches. Thorax blackish on each side. Abdomen with black crests. Fore wings with a blackish patch, which extends along the costa from the base to a little beyond half the length; a blackish costal streak nearer the tip; four irregular exterior lines composed of black cuneiform marks; the 4th submarginal, more regular than the others; fringe with blackish marks. Length of the body 5 lines; of the wings 12 lines.

149. *LACIDA STRIGIFIMBRIA*, n. s. *Mas.* Fusca, abdomine alisque pallide cinereis, alis anticis nigro conspersis fusco bifasciatis nigroque subtrifasciatis fimbria lituris subquadratis fuscis.

*Male.* Brown. Antennæ with long pubescent branches. Abdomen, hind wings, and underside pale cinereous. Fore wings black-speckled, with some black marks which form three very irregular and incomplete bands; an irregular interior band and a broad marginal space pale cinereous; fringe with brown subquadrate marks. Length of the body  $3\frac{1}{2}$  lines; of the wings 10 lines.

Gen. *MELIA*, *Walk.*

150. *MELIA CUNEIFERA*, n. s. *Mas.* Schistaceo-cinerea, capite thoraceque antico ferrugineis, alis anticis apice rotundatis costa subconvexa vitta costali ferruginea nigro notata striga obliqua lineaque submarginali angulosa nigris.

*Male.* Slaty cinereous. Head and fore part of the thorax ferruginous. Palpi porrect, short, lanceolate, rather slender. Antennæ slightly pectinated. Fore wings rounded at the tips; costa slightly convex; a ferruginous stripe with some black marks extending along part of the costa, and emitting an irregular black streak towards the middle of the exterior border; submarginal line black, slender, deeply and very acutely zigzag, or forming cuneiform marks. Length of the body  $3\frac{1}{2}$  lines; of the wings 8 lines.

Gen. *AMSACTA*, *Walk.*

151. *AMSACTA LITHOSIODES*, n. s. *Mas.* Nigro-fusca, capite thorace antico pectore ventrequе ochraceis, alis elongatis fimbria cinerea, anticis ferrugineo suffusis.

*Male.* Blackish brown. Head, fore part of the thorax, pectus, abdomen beneath and at the tip, and legs ochraceous. Palpi porrect, broad, obtuse. Antennæ very deeply pectinated. Wings elongate; fringe mostly pale cinereous. Fore wings with a ferruginous tinge. Length of the body 4 lines; of the wings 12 lines.

Gen. *NAXA*, *Walk.*

152. *Naxa textilis*, *Walk. Cat. Lep. Het.* 1st ser. 1743.  
Inhabits also Hindostan.

Gen. *REDOA*, *Walk.*

153. *REDOA MICACEA*, n. s. *Mas.* Pallide testacea, subtus alba, capite niveo fascia lata fusca, thorace antico niveo, alarum squamis micantibus pallidis et ochraceis fimbria rufescente.

*Male.* Pale testaceous, white beneath. Head pure white, with a broad brown band between the antennæ. Thorax pure white in front; hind part and fore wings with numerous pale and ochraceous spangles. Wings with a reddish fringe. Hind wings white in front. Length of body 7 lines; of the wings 16 lines.

154. *REDOA TRANSIENS*, n. s. *Mas.* Nivea, capite cervino fascia alba, pedibus anticis nigro et ochraceo notatis, alarum squamis albis micantibus fimbria pallidissime cervina, alis anticis puncto discali nigro costa ochracea.

*Male.* Pure white. Head fawn-colour, with a white band in front. Fore legs with black and ochraceous marks. Wings with glittering white spangles; fringe with a very pale fawn-coloured tinge. Fore wings with a black point at the tip of the discal areolet; costa ochraceous. Length of the body 6 lines; of the wings 14 lines.

*Female?* Much smaller, and entirely white with the exception of the black point on the fore wings. Length of the body 3 lines; of the wings 8 lines.

This may be a variety of *R. submarginata*: it differs from that species in the costa of the fore wings, which is ochraceous along the whole length.

155. *REDOA MARGINALIS*, n. s. *Mas.* Nivea, vertice palpisque apice fuscis, alarum squamis micantibus strigis marginalibus cinereis fimbria obscure cinerea, alis anticis costa apicali cinerea.

*Male.* Pure white. Head, except in front and tips of the palpi, brown. Wings spangled, with slight cinereous streaks along the exterior border; fringe dark cinereous. Fore wings with a cinereous tinge along the apical part of the costa. Length of the body  $5\frac{1}{2}$  lines; of the wings 13 lines.

156. *REDOA PERFECTA*, n. s. *Mas.* Nivea, capitis guttis duabus palpisque apice nigris, pedibus anterioribus nigro guttatis, alarum squamis albis micantibus.

*Male.* Pure white. Head with a black dot on each side. Palpi with black tips. Anterior legs with black dots. Wings wholly white, with white spangles. Length of the body 8 lines; of the wings 18 lines.

#### Gen. EUPROCTIS.

157. *EUPROCTIS FUSIPENNIS*, n. s. *Mas.* Alba, corpore subtestaceo, alis anticis oblongis angustis apice subrotundatis vix testaceo tinctis, posticis apice obtusis.

*Male.* White. Body somewhat testaceous, which hue extends slightly over the fore wings. Fore wings narrow, fusiform, slightly rounded at the tips; exterior border extremely oblique; interior border with some very long hairs. Hind wings obtuse but hardly truncated at the tips. Length of the body 6 lines; of the wings 14 lines.

158. *EUPROCTIS XANTHOMELA*, n. s. *Mas.* Læte ochracea, abdomine alisque posticis nigris, his pallido marginatis, alis anticis nigro subconspersis gutta discali atra.

*Male.* Bright ochraceous, paler beneath. Antennæ with very long pubescent branches. Abdomen black, except at the base and at the



tip. Fore wings thinly speckled with black; discal dot deep black. Hind wings black, broadly bordered with pale ochraceous. Length of the body 7 lines; of the wings 18 lines.

This species is most allied to *E. atomaria*.

159. *EUPROCTIS MUNDA*, n. s. *Mas.* Pallidissime cervina, alis anticis angustis apice rotundatis margine exteriore perobliquo margine interiore pilis longis penicillatis.

*Male.* Very pale fawn-colour or nankeen-colour. Antennæ short, with long pubescent branches. Legs slender, rather thinly clothed with long hairs. Fore wings narrow, rounded at the tips; exterior border extremely oblique; interior border furnished with long plumose hairs. Length of the body  $4\frac{1}{2}$  lines; of the wings 12 lines.

160. *EUPROCTIS DIVISA*, n. s. *Mas.* Cervina, capite antico lutescente, abdomine fusco, fasciculo apicali pedibusque luteis, alis posticis fuscis testaceo-pallido marginatis.

*Male.* Fawn-colour. Head and thorax with long hairs, the former somewhat luteous in front. Antennæ very broadly pectinated. Abdomen brown; apical tuft and legs luteous. Fore wings somewhat paler along the costa and towards the exterior border. Hind wings brown, bordered with pale testaceous; interior border densely pilose. Length of the body 8 lines; of the wings 18 lines.

161. *EUPROCTIS GUTTISTRIGA*, n. s. *Mas.* Lutescens, abdomine alisque posticis fuscis, his pallido marginatis, alis anticis nigro conspersis lineis duabus abbreviatis guttularibus nigris. *Fem.* Capite fusco, thorace antico ochraceo, alis anticis linea interiore obsoleta, alis posticis luteo fimbriatis.

*Male.* Dull luteous. Antennæ very broadly pectinated. Abdomen and hind wings brown, the latter with a pale border. Fore wings black-speckled, with two oblique lines which are composed of black dots and are abbreviated in front.

*Female.* Head and antennæ brown, the latter slightly pectinated. Thorax ochraceous in front. Fore wings with the interior line obsolete. Hind wings with a luteous fringe. Length of the body 5-6 lines; of the wings 14-18 lines.

#### Gen. *CASSIDIA*, n. g.

*Mas.* Corpus robustum. Proboscis obsoleta. Palpi lineares, oblique ascendentes, apice rotundati. Antennæ latissime pectinatæ. Alæ latæ, breves; anticæ apice subrotundatæ, costa vix convexa; posticæ dilatatæ, margine exteriore angulato.

*Male.* Body stout. Proboscis obsolete. Palpi linear, obliquely ascending, rounded at the tips, not rising to the front. Antennæ very broadly pectinated. Wings broad, short. Fore wings somewhat rounded at the tips; costa hardly convex; exterior border slightly

convex and oblique. Hind wings produced in the direction of the body, which extends beyond the hind wings; middle of the exterior border forming a prominent but obtuse angle.

This genus is nearly allied to *Euproctis*, from which it may be clearly distinguished by the form of the hind wings.

162. *CASSIDIA OBTUSA*, n. s. *Mas.* Subtestaceo-alba, capite palpisque ochraceis, alis posticis albis margine exteriore subtestaceo.

*Male.* White, with a slight testaceous tinge. Head and palpi ochraceous. Hind wings white, with the exception of a very slight testaceous tinge along the exterior border. Length of the body 4 lines; of the wings 10 lines.

#### Gen. CISPIA, *Walk.*

Somena, *Walk.*, may be united to this genus.

163. *Cispia plagiata*, *Walk. Cat. Lep.* 1st ser. 858.

The male of *C. plagiata*, from Nepal, has the fore wings largely varied with yellow, whereas in the male specimen here recorded they are wholly brownish ochraceous, with the exception of the base and a discal spot; the hind wings also are darker.

Inhabits also Hindostan.

#### Gen. DASYCHIRA, *Hüb.*

164. *DASYCHIRA APICALIS*, n. s. *Mas.* Alba, frontis lateribus nigris, pedibus nigro fasciatis, alis opalinis cinerascete bifasciatis, anticis costa nigro tinctata litura discali nigricante interrupta, posticis gutta discali subtus liturisque apud marginem interiorem nigris.

*Male.* White. Head with a black line on each side of the front. Abdomen, extending beyond the hind wings, with a cinereous tinge. Legs with black bands. Wings with opaline lustre; two indistinct and very diffuse exterior cinereous bands. Fore wings somewhat rounded at the tips, with three black marks along the apical part of the costa; a blackish discal mark divided by the transverse vein of the discal areolet. Hind wings with long hairs; some black marks along the interior border, and a black discal dot on the under side. Length of the body 9 lines; of the wings 18 lines.

165. *DASYCHIRA SIGNIFERA*, n. s. *Mas.* Alba, frontis lateribus nigris, alis subopalinis, anticis costa nigro binotata punctis venarum tribus nigris litura discali nigricante interrupta, posticis cinereo bifasciatis gutta discali subtus liturisque apud marginem interiorem nigris.

*Male.* White. Head with a black line on each side of the front. Wings with slight opaline lustre. Fore wings rounded at the tips, with two black marks on the apical part of the costa, and with a slight indication of a cinereous exterior line, which is accompanied by three black points on the veins; discal black mark divided as in

*D. apicalis*. Hind wings with black marks along the interior border, with a black discal dot on the under side, and with cinereous exterior and submarginal bands; these are abbreviated in front. Length of the body 5 lines; of the wings 12 lines.

This and *D. apicalis* have a close resemblance to each other, but can hardly be considered as one species.

166. *DASYCHIRA LONGIPENNIS*, n. s. *Fæm.* Alba, tarsis anterioribus nigro fasciatis, alis longissimis lunula discali nigricante, anticis nigro conspersis vix lineatis costa convexa margine exteriore perobliquo.

*Female*. White. Anterior tarsi with black bands. Wings very long, with a blackish discal lunule, which is most distinct on the under side. Fore wings minutely black-speckled; the speckles indicating here and there by their confluence three denticulated lines, of which the submarginal one is the most complete; costa convex; exterior border extremely oblique. Length of the body 10 lines; of the wings 28 lines.

#### Gen. ERNOLATIA, n. g.

*Mas.* Corpus crassum. Proboscis obsoleta. Palpi breves, graciles, decumbentes. Antennæ brevissimæ, latissime pectinatae. Abdomen valde cristatum. Alæ anticæ apice subrectangulatæ, margine exteriore flexo.

*Male*. Body thick. Proboscis obsolete. Palpi short, slender, decumbent. Antennæ very short, broadly pectinated. Abdomen highly crested along the whole length, not extending beyond the hind wings. Legs moderately long and stout. Wings ample. Fore wings nearly rectangular at their tips; costa straight; exterior border bent opposite the 1st inferior vein, behind which it is very oblique:

This genus seems to be closely allied to *Dasychira*, but may be distinguished by the structure of the abdomen and of the fore wings.

167. *ERNOLATIA SIGNATA*, n. s. *Mas.* Alba, abdominis crista apiceque lutescentibus, alis subopalinis lineis duabus undulatis diffusis indistinctis pallidissime cervinis 1<sup>a</sup> fusco punctata, posticis margine interiore sublanuginoso lituris obscurioribus.

*Male*. White. Abdomen with a pale luteous tinge, which is most prevalent along the crest and at the tip. Wings slightly opaline, with diffuse indistinct undulating very pale fawn-coloured exterior and submarginal lines, of which the former is accompanied by elongated brown points on the veins. Fore wings with a still more faint fawn-coloured tinge on the disk. Hind wings with a few darker marks on the interior border, which is somewhat lanuginous. Length of the body 7 lines; of the wings 18 lines.

#### Gen. LYMANTRIA, Hübner.

168. *LYMANTRIA MARGINALIS*, n. s. *Mas.* Alba, abdominis vittis

duabus tarsis apice tibiisque roseis, alis anticis lituris costalibus nigris guttis apud marginem exteriorem nigricantibus lineis tribus e lunulis fuscis.

*Male.* White. Abdomen with a rosy stripe along each side. Tibiæ and tips of the tarsi rosy. Fore wings with black marks at the base and along the costa, and with one black mark on the interior border near the base; exterior border with a row of blackish dots; three oblique rows of brown lunules. Length of the body 8 lines; of the wings 20 lines.

Gen. JANA, *Boisd.*

169. *Jana pallida*, *Walk. Cat. Lep. Het.* 1st ser. 912.

Inhabits also Hindostan and Sumatra.

Fam. PSYCHIDÆ, *Bruand.*

Gen. EUMETA, *Walk.*

170. *Eumeta Cramerii*, *Westw. Proc. Zool. Soc. Lond.* (1854), 236. pl. 37. f. 4 (*Oiketicus*).

Inhabits also Ceylon.

Fam. NOTODONTIDÆ, *Steph.*

Gen. CERURA, *Schr.*

171. *Cerura liturata*, *Walk. Cat. Lep. Het.* 1st ser. 988.

Inhabits also Hindostan.

Gen. ALIMALA, n. g.

*Mas.* *Corpus* robustum. *Proboscis* distincta. *Palpi* longi, ascendentes, angulati, caput superantes; articulus 2<sup>us</sup> longissimus; 3<sup>us</sup> brevissimus. *Antennæ* subpectinatae, apice setulosæ, basi convolutæ et dilatatae. *Abdomen* lineare, alas posticas longissime superans. *Pedes* robusti; tibiæ posticæ densissime fasciculatae. *Alæ* sat parvæ; anticæ apice rotundatæ, margine exteriore perobliquæ.

*Male.* Body stout. *Proboscis* distinct. *Palpi* long, vertical, rising to some height above the head; 2nd joint linear, very long; 3rd very short, inclined forward and forming an angle with the 2nd. *Antennæ* serrated or slightly pectinated, merely setulose towards the tips, spiral and dilated towards the base, the convolution terminating in a broad knot. *Abdomen* linear, extending far beyond the hind wings. *Legs* stout; hind tibiæ most densely tufted with long hairs. *Wings* somewhat small. Fore wings rounded at the tips; costa straight; exterior border slightly convex, very oblique.

Allied to *Pterostoma*.

172. *ALIMALA LIMACODOIDES*, n. s. *Mas.* Cervina, alis antice lineis duabus denticulatis nigricantibus valde indistinctis maculis duabus discalibus nigro-cinereis albido marginatis linea submarginali cinerea recta obliqua.

*Male.* Fawn-colour. Antennæ with the nodosity black. Abdomen, under side, and hind wings cinereous-tinged. Fore wings with blackish denticulated very indistinct interior and exterior lines, between which there are two blackish-cinereous whitish-bordered discal spots, one behind the other; a distinct, straight, oblique, cinereous, submarginal line. Length of the body 7 lines; of the wings 14 lines.

### Gen. *CASCHARA*, n. g.

*Mas.* *Corpus* sat robustum. *Proboscis* obsoleta. *Palpi* validi, ascendentes; articulus 3<sup>us</sup> obtusus, minimus. *Antennæ* late pectinatae, apice crenulatae. *Abdomen* alas posticas sat superans. *Pedes* breves, robusti, pilosi. *Alæ* anticae sat latae, apice subrotundatae, margine exteriore subdentato, margine interiore intus dilatato et fimbriato extus excavato.

*Male.* Body rather stout. *Proboscis* not apparent. *Palpi* stout, obliquely ascending, not extending beyond the head; 3rd joint obtuse, very minute. *Antennæ* broadly pectinated to three-fourths of the length, crenulated from thence to the tips. *Abdomen* extending rather far beyond the hind wings. *Legs* short, stout, pilose. *Wings* rather broad. Fore wings slightly rounded at the tips; costa straight; exterior border straight, rather oblique, slightly dentate; interior border dilated and with a long fringe towards the base, excavated exteriorly. Hind wings with the exterior border convex, entire.

This genus, with regard to the interior border of the fore wings, resembles *Lophopteryx* and *Spatalia*.

173. *CASCHARA PUNCTIFERA*, n. s. *Mas.* Rufescenti-cervina, alis anticis flavo-testaceo variis lineis nonnullis ferrugineis lunulatis parallelis linea basali subrecta alba nigricante marginata punctis tribus subcostalibus nigris macula discali flavescenti-alba linea exteriore recta obliqua alba rufescente marginata.

*Male.* Reddish fawn-colour. Abdomen, hind wings, and underside paler. Fore wings varied with yellowish testaceous, which hue is most prevalent exteriorly; several lunulate parallel ferruginous lines; a white, nearly straight line near the base, blackish-bordered on the inner side, and having beyond it three black subcostal points; discal spot yellowish whitish-bordered, with a rectangular notch on its inner side, and with two black subcostal points beyond it; a white straight oblique exterior line, reddish-bordered on the outer side. Hind wings without any markings; fringe whitish. Length of the body 10 lines; of the wings 20 lines.

Gen. *EXÆRETA*, *Hüb.*

174. *EXÆRETA SMARAGDIPLANA*, n. s. *Mas.* Cervina, abdominis segmentis albido marginatis, alis anticis ex maxima parte ferrugineo-fuscis fasciis sex deviis smaragdinis.

*Male.* Fawn-colour. Abdomen and underside paler. Palpi porrect, not extending beyond the head; 3rd joint conical, minute. Antennæ broadly pectinated to beyond half the length, simple from thence to the tips. Abdomen extending rather far beyond the hind wings; hind borders of the segments whitish. Fore wings mostly dark ferruginous brown, with about six various irregular bright emerald-green bands; exterior border very oblique. Length of the body 10 lines; of the wings 22 lines.

Gen. *ICHTHYURA*, *Hüb.*

175. *ICHTHYURA DORSALIS*, n. s. *Mas.* Cinereo-cervina, palpis nigro vittatis, thorace vittis duabus ferrugineis, alis anticis antice rufescenti-cervinis lineis quatuor albidis subundulatis subdenticulatis nigricante marginatis macula discali nigricante subrotunda albido marginata.

*Male.* Cinereous fawn-colour. Palpi porrect, broad, obtuse, extending very little beyond the head, with a black stripe on the outer side. Antennæ broadly pectinated to the tips. Thorax in front with a short, broad, reddish-brown stripe. Abdomen extending somewhat beyond the hind wings; apical tuft forked. Fore wings reddish fawn-colour in front, with four slender whitish, blackish-bordered, slightly undulating and denticulated lines, of which the third is abbreviated in front by the blackish, whitish-bordered, nearly round discal spot; 5th submarginal line composed of elongated points. Hind wings without markings. Length of the body 8 lines; of the wings 14 lines.

Gen. *DEDIAMA*, *Walk.*

176. *DEDIAMA BASIVACUA*, n. s. *Mas.* Lignicolor, palpis supra fuscis, alis anticis striga basali postica nigra linea ferruginea flexa intus cervino marginata spatio exteriore flavesciente atomis lineisque nonnullis denticulatis nigris, alis posticis albido-testaceis litura apud angulum interiorem fusca nigro marginata.

*Male.* Wood-colour, or pale testaceous, with a fawn-coloured tinge. Palpi ascending, brown above, applied to the front, not rising to the vertex; 2nd joint very slightly curved; 3rd very minute. Antennæ minutely serrated and pubescent. Abdomen extending somewhat beyond the hind wings; apical tuft rather small. Fore wings with a small black streak hindward near the base, and with a ferruginous very deeply bent line which is bordered with fawn-colour on the inner side; beyond this line the wings are yellowish, black-speckled, and with several black denticulated transverse lines. Hind wings whitish

testaceous, without markings, except an irregular brown black-bordered mark by the interior angle. Length of the body 8 lines; of the wings 18 lines.

Gen. JANASSA, *Walk.*

177. JANASSA CERIGOIDES, n. s. *Mas.* Cinereo-alba, palpis nigro marginatis, thorace fascia nigra, abdomine testaceo, alis anticis testaceis litura discali longa obliqua albida nigro marginata lineis sex interioribus tribusque exterioribus nigris, alis posticis pallide luteis macula discali margineque nigro-fuscis.

*Male.* Cinereous white. Palpi porrect, short, very broad and obtuse, broadly black-bordered on the outer side. Antennæ short, very broadly pectinated. Thorax with a slight black band. Abdomen testaceous, tapering, extending far beyond the hind wings. Fore legs densely pilose. Wings whitish beneath, with an elongated black discal spot. Fore wings testaceous, with an oblique, long, narrow, whitish, black-bordered discal mark, between which and the base there are six irregular zigzag black lines; three more oblique black lines between the spot and the exterior border, the 2nd one incomplete; exterior border convex, extremely oblique. Hind wings pale luteous; discal spot and broad marginal band blackish brown. Length of the body 10 lines; of the wings 20 lines.

Gen. ELEALE, n. g.

*Mas.* Corpus sat robustum. Antennæ dimidio basali pectinatae. Abdomen longiconicum, alas posticas valde superans. Pedes læves, sat graciles; tibiæ posticæ calcaribus quatuor longissimis. Alæ anticæ apice rectangulatae, margine exteriori flexo.

*Male.* Body moderately stout. Antennæ moderately pectinated to half the length, bare from thence to the tips. Abdomen elongate-conical, extending much beyond the hind wings. Legs rather slender, bare; hind tibiæ with four very long spurs. Wings moderately broad. Fore wings rectangular at the tips; exterior border not oblique along the fore part, bent beyond the middle, very oblique from thence to the interior angle.

Allied to *Edema*.

178. ELEALE PLUSIOIDES, n. s. *Mas.* Ochracea, abdominis segmentis albo marginatis, alis anticis auratis fascia purpurascente lata per-obliqua lineis duabus ferrugineis flexis 2<sup>a</sup> argenteo marginea margine exteriori purpurascente lineam angulosam argenteam includente, alis posticis subaurato-albidis plaga apud angulum interiorem purpurascenti-cuprea strigam argenteam includente.

*Male.* Ochraceous. Hind borders of the abdominal segments white. Fore wings gilded, with a broad very oblique purplish band, and with two bent ferruginous lines, of which the 2nd is partly silvery-bordered

on the outer side; exterior border purplish, including a zigzag silvery line. Hind wings whitish, slightly gilded; interior angle with a large purplish-cupreous patch, which includes a silvery streak. Length of the body 6 lines; of the wings 14 lines.

Gen. SACADA, n. g.

*Mas. Corpus robustum. Proboscis brevis, distincta. Palpi breves, lati, subflexi; articulus 3<sup>us</sup> conicus. Antennæ late pectinatæ, apices versus nudæ. Abdomen alas posticas non superans. Pedes sat robusti; tibiæ fasciculatæ, posticæ calcaribus quatuor parvis; tarsi postici basi fasciculati. Alæ anticæ vix acutæ, margine exteriori subconvexo sat obliquo.*

*Male.* Body stout. Proboscis short, distinct. Palpi broad, short, slightly bent, extending a little beyond the front; 3rd joint conical. Antennæ broadly pectinated to two-thirds of the length, bare from thence to the tips. Abdomen not extending beyond the hind wings. Legs moderately stout; tibiæ tufted; hind tibiæ with four short spurs; hind tarsi tufted towards the base. Wings moderately broad. Fore wings hardly acute; costa straight; exterior border very slightly convex, rather oblique; the four inferior veins nearly equidistant from each other.

179. SACADA DECORA, n. s. *Mas.* Rosea, capite thoraceque ochraceis, abdomine alisque posticis cinereis, tarsi albis, alis anticis annulo basali magno oblongo albo plagam nigram includente punctis duobus discalibus nigris linea exteriori recta obliqua cinerea extus nigricante marginata.

*Male.* Rosy red; paler beneath. Head and thorax more ochraceous. Abdomen and hind wings cinereous. Tarsi white; hind tarsi with the basal joint reddish. Fore wings near the base with a large transversely oblong whitish ringlet which encloses a black patch hindward; two black discal points, one subcostal; a cinereous straight oblique exterior line, which is diffusely blackish-bordered on the outer side. Length of the body 5 lines; of the wings 12 lines.

Gen. AGABRA, n. g.

*Mas. Corpus vix robustum. Proboscis brevis. Palpi porrecti, angulati, caput sat superantes; articulus 2<sup>us</sup> longus, latus, pilosus; 3<sup>us</sup> brevis, conicus. Antennæ triente basali incrassatæ. Abdomen cristatum, alas posticas paullo superans; fasciculus apicalis compressus. Pedes sat graciles, tarsi basi tibiisque fimbriatis, calcaribus quatuor longis. Alæ anticæ apice rectangulatæ, margine exteriori subflexo.*

*Male.* Body hardly stout. Frontal tuft prominent. Proboscis short. Palpi porrect, extending somewhat beyond the head; 2nd joint broad, long, pilose; 3rd short, conical, forming an angle with the 2nd. Antennæ incrassated from the base to full one-third of the length, where



the dilated part widens angularly and terminates. Abdomen crested, tapering, with a compressed apical tuft extending a little beyond the hind wings. Legs rather slender; tarsi, towards the base, and tibiae fringed; hind tibiae with four long spurs. Wings moderately broad. Fore wings rectangular at the tips; costa straight; exterior border slightly bent in the middle; 1st, 2nd, and 3rd inferior veins approximate at the base; 4th not very remote.

180. *AGABRA TRILINEATA*, n. s. *Mas.* Ochraceo-rufa, abdomine cinereo cristis ochraceis, alis anticis litura basali fasciisque duabus trilineatis strigaeque exteriore obliqua albis fascia 1<sup>a</sup> angulata 2<sup>a</sup> undulata lineis duabus exterioribus albis 1<sup>a</sup> angulata 2<sup>a</sup> e lunulis, alis posticis rufescenti-cinereis.

*Male.* Ochraceous red. Abdomen cinereous, with ochraceous crests. Fore wings with a white discal mark near the base, and with two white bands, each of which is composed of three lines; 1st band forming an outward angle, which is contiguous to an elongated oblique white discal streak, the latter interlined with reddish; 2nd band undulating, succeeded by a white irregular line, one of whose angles interrupts the white submarginal line, the latter formed of lunules. Hind wings cinereous, reddish-tinged exteriorly. Length of the body 6 lines; of the wings 12 lines.

Gen. *SARBENA*, n. g.

*Mas.* *Corpus* sat robustum. *Proboscis* obsoleta. *Palpi* porrecti, compressi, pubescentes, sat graciles, caput sat superantes. *Antennae* convolutae, dimidio basali pectinatae. *Abdomen* subcylindricum, alas posticas superans. *Pedes* graciles, vix pilosi; tibiae posticae calcariibus quatuor longissimis. *Alae* sat angustae; anticae apice rotundatae, costa vix convexa, margine exteriore perobliquo.

*Male.* Body moderately stout. *Proboscis* not apparent. *Palpi* porrect, compressed, pubescent, rather slender, extending some distance beyond the head; 3rd joint minute, obtuse, less than one-fourth of the length of the 2nd. *Antennae* convoluted, slightly pectinated to half the length, slender and bare from thence to the tips. Abdomen nearly cylindrical, extending somewhat beyond the hind wings. Legs slender, hardly pilose; hind tibiae with four very long spurs. Wings rather narrow. Fore wings somewhat rounded at the tips; costa very slightly convex; exterior border straight, very oblique; 1st and 2nd inferior veins contiguous at the base; 3rd not remote; 4th very remote.

181. *SARBENA LIGNIFERA*, n. s. *Mas.* Lignicolor, alis anticis nigro substrigatis et subconsersis subtus fusciscentibus, alis posticis pallide cinereis.

*Male.* Wood-colour. Fore wings slightly and irregularly streaked and speckled with black, mostly brownish beneath. Hind wings pale

cinereous, without markings. Length of the body  $4\frac{1}{2}$  lines; of the wings 11 lines.

Gen. AMATISSA, n. g.

*Mas.* *Corpus* robustum, pilis longis dense vestitum. *Proboscis* obsoleta. *Palpi* brevissimi. *Antennæ* breves, late pectinatæ. *Abdomen* alas posticas paullo superans. *Pedes* breves. *Alæ* amplæ; anticæ rotundatæ, costa apicem versus subconvexa, margine exteriore recto sat obliquo.

*Male.* Body stout, thickly clothed with long hairs. Proboscis not apparent. Palpi very short. Antennæ short, broadly pectinated to the tips. Abdomen extending a little beyond the hind wings. Legs short. Wings ample. Fore wings somewhat rounded at the tips; costa straight, except towards the tip, where it is very slightly convex; exterior border straight, rather oblique; 1st and 2nd inferior veins contiguous at the base; 3rd more than twice as far from the 4th as from the 2nd.

182. AMATISSA INORNATA, n. s. *Mas.* Cervina, lituris nullis.

*Male.* Fawn-colour, without any markings. Length of the body 6 lines; of the wings 15 lines.

Gen. GAUGAMELA, n. g.

*Mas.* *Corpus* robustum. *Frons* carinata. *Proboscis* obsoleta. *Palpi* porrecti, validi, obtusi, caput perpaullo superantes. *Antennæ* breviusculæ, late pectinatæ. *Abdomen* alas posticas superans, pilis basilibus longis, fasciculo apicali furcato. *Pedes* breves, vix robusti; tibiæ late fimbriatæ, calcaribus longis. *Alæ* spissæ; anticæ apice rectangulatæ, margine exteriore postico sat obliquo; posticæ margine interiore fimbriato.

*Male.* Body robust. Front somewhat grooved. Proboscis not apparent. Palpi porrect, stout, obtuse, extending very little beyond the head. Antennæ broadly pectinated, not long. Abdomen with long hairs towards the base, extending somewhat beyond the hind wings, slightly tapering from the base to the tip, furnished with a furcate apical tuft. Legs short, hardly stout; tibiæ broadly and densely fringed; spurs long. Wings stout, moderately broad. Fore wings rectangular at the tips; costa straight; exterior border slightly convex, rather oblique hindward. Hind wings fringed with long hairs along the interior border.

183. GAUGAMELA ATRIFRONS, n. s. *Mas.* Cinereo-ferruginea, capitis vitta thoracisque macula quadrata atris, alis anticis basi lineis duabus canis subundulatis macula discali nigricante testaceo marginata lineis tribus exterioribus nigricantibus subundulatis vix conspicuis gutta subapicali testacea plaga marginali cervina.

*Male.* Ferruginous, tinged with cinereous. Head with a broad deep-

black stripe. Thorax in front with a large quadrate deep-black spot. Fore wings with two hoary slightly undulating transverse lines near the base, and with a large blackish testaceous-bordered discal spot, three more exterior, slightly undulating, very indistinct blackish lines, a testaceous dot near the tip, and a fawn-coloured patch on the exterior border. Hind wings paler. Length of the body 8 lines; of the wings 17 lines.

Gen. ANIGRÆA, n. g.

*Mas.* *Corpus robustum. Proboscis obsoleta. Palpi læves, longi, compressi, ascendentes, verticem non superantes, articulo 3o lanceolato. Antennæ validæ, simplices. Abdomen lanceolatum, alas posticas sat superans, fasciculis duobus apicalibus deflexis. Pedes robusti; tibiæ subfasciculatæ; posticæ calcaribus quatuor longissimis. Alæ spissæ, sat angustæ; anticæ apice rotundatæ, margine exteriori vix flexo.*

*Male.* Body robust. Proboscis not apparent. Palpi long, compressed, ascending, smooth, not rising higher than the vertex; 3rd joint lanceolate, about half the length of the 2nd. Antennæ stout, bare, moderately long. Abdomen lanceolate, extending rather far beyond the hind wings, furnished with two diverging apical tufts. Legs stout; tibiæ slightly tufted; hind tibiæ with four very long spurs. Wings robust, rather narrow. Fore wings much rounded at the tips; costa straight; exterior border very slightly bent, its hind part extremely oblique; inferior veins approximate.

This genus has some resemblance to the *Thermesiidæ*.

184. ANIGRÆA RUBIDA, n. s. *Mas.* Ferrugineo-rufa, alis viridi-aurato tinctis linea marginali pallide cinerea, alis anticis lineis nonnullis obscurioribus obliquis indistinctis subrectis, alis posticis litura discali lineisque duabus exterioribus fasciaque marginali fuscis.

*Male.* Ferruginous red, more cinereous beneath. Wings slightly tinged with golden green; a pale-cinereous marginal line. Fore wings with four or five indistinct oblique nearly straight darker lines. Hind wings beneath cinereous, with a brown discal mark, and with two exterior brown lines, and with a broad marginal brown band. Length of the body 6 lines; of the wings 15 lines.

Gen. THELDE, n. g.

*Mas.* *Corpus robustum. Proboscis obsoleta. Palpi breves, latissimi, articulis indistinctis. Antennæ breviusculæ, latissime pectinatæ. Abdomen alas posticas non superans. Pedes robusti, hirsuti; antici dense fasciculati. Alæ latæ, non longæ; anticæ vix acutæ, costa apicem versus subconvexa.*

*Male.* Body stout. Proboscis not apparent. Palpi extending very little beyond the head, extremely broad and obtuse; joints indistinct. Antennæ very broadly pectinated, not long. Abdomen not extending

beyond the hind wings. Legs stout, hirsute; fore legs densely tufted. Wings broad, not long. Fore wings hardly acute; costa straight except towards the tip, where it is very slightly convex; exterior border hardly convex, moderately oblique; 1st, 2nd, and 3rd inferior veins approximate at the base.

This genus should perhaps be removed from the *Notodontidæ*.

185. *THELDE PATULA*, n. s. *Mas.* Ferruginea, alis anticis nigro conspersis ex parte cerninis lineis nonnullis transversis indistinctis e lunulis nigris, alis posticis cinereo-fuscis.

*Male.* Ferruginous, cinereous beneath. Fore wings black-speckled, partly fawn-coloured, with some indistinct and irregular black transverse lines composed of lunules. Hind wings cinereous brown. Length of the body 7 lines; of the wings 16 lines.

#### Gen. *ALLATA*, n. g.

*Mas.* *Corpus* robustum. *Proboscis* obsoleta. *Palpi* porrecti, latissimi, caput vix superantes, articulis indistinctis. *Antennæ* late pectinatae, apices versus nudæ. *Abdomen* longum, cylindricum, alas posticas valde superans. *Pedes* breviusculi, vix robusti; tibiæ posticæ calcaribus quatuor longis. *Alæ* sat angustæ, apice rotundatæ, margine exteriori perobliquo.

*Fem.* *Antennæ* pectinatae.

*Male.* Body stout. Proboscis not apparent. Palpi porrect, extending very little beyond the head, very broad and obtuse; joints indistinct. Antennæ broadly pectinated to a little beyond half the length, bare from thence to the tips. Abdomen long, cylindrical, extending far beyond the hind wings; apical tuft long. Legs rather short, hardly stout; hind tibiæ with four long spurs. Fore wings rather narrow, rounded at the tips; costa straight; exterior border hardly convex, very oblique; 3rd inferior vein rather remote from the 2nd; 4th very remote; interior border slightly dilated towards the base, slightly excavated exteriorly.

*Female.* Antennæ with the basal part moderately pectinated.

186. *ALLATA ARGENTIFERA*, n. s. *Mas.* Fusca, capite lituris duabus albidis, alis anticis nigro fuscoque notatis vitta discali interrupta argentea apice furcata.

*Male.* Brown. Head with a whitish mark at the base of each of the antennæ, the latter also whitish. Abdomen and underside cinereous; apical tuft of the former partly brown. Fore wings cinereous, with several irregular black and brown marks, whereby the colour is wood-like; a short silvery discal stripe, which is twice interrupted and is forked at its tip. Hind wings brownish cinereous. Length of the body 10 lines; of the wings 20 lines.

187. *ALLATA ALBONOTATA*, n. s. *Mas.* Obscure ferrugineo-fusca,

abdomine fascia apicali pallida, alis anticis purpurascente tinctis lineis denticulatis lunulisque submarginalibus testaceis nigro marginatis striga exteriori nigra maculis submarginalibus rufescentibus liturisque duabus albis.

*Male.* Dark ferruginous brown, cinereous brown beneath. Abdomen with a pale apical stripe. Fore wings with a purplish bloom, and with some transverse denticulated, testaceous, black-bordered lines; submarginal lunules of the same hue, each accompanied by a reddish spot; the white part of the fifth lunule from the tip dilated, and terminating a black streak which proceeds from the disk; a white sub-apical spot, and a testaceous stripe along the interior border. Hind wings brownish cinereous.

*Female.* Slightly paler. Abdomen with a whitish dorsal line. Length of the body 9–10 lines; of the wings 22–24 lines.

• Gen. PHUSIANA, n. g.

*Mas.* *Corpus* sat robustum. *Proboscis* brevis, distincta. *Palpi* breves, validi, ascendentes, vix arcuati, articulo 3<sup>o</sup> minimo. *Antennæ* serratæ, subpubescentes. *Abdomen* cylindricum, longissimum, basi fasciculatum. *Pedes* breves, robusti, pilosi, calcaribus parvis. *Alæ* elongatæ; anticæ sat angustæ, vix acutæ, margine exteriori per-obliquæ.

*Male.* Body moderately stout. *Proboscis* short, distinct. *Palpi* short, stout, hardly curved, obliquely ascending, not rising to the vertex; 3rd joint very minute. *Antennæ* serrated, minutely pubescent, moderately long. *Abdomen* cylindrical, very long, with a basal tuft extending for half its length beyond the hind wings. *Legs* short, stout, pilose; spurs short. *Wings* elongate. Fore wings rather narrow, hardly acute; costa straight; exterior border extremely oblique; 3rd inferior vein very remote from the 2nd.

This genus has some resemblance to the *Cossidæ*.

188. PHUSIANA ALBIFRONS, n. s. *Mas.* Cinereo-fusca, capite inter antennis albo, alis anticis cinereis nigro conspersis antice fuscis fascia strigæque basalibus nigris striga apicali albida rufescente marginata.

*Male.* Cinereous brown. Head with a white spot between the antennæ, each of which has a white basal tuft. Fore wings cinereous, irregularly speckled with black; the speckles most conspicuous near the base, in the disk, and along the interior border, where they form an interrupted band and a streak; fore part irregularly brown; a whitish, reddish-bordered, jagged streak extending from the disk to the tip. Hind wings without any markings. Length of the body 16 lines; of the wings 30 lines.

Gen. ARMIANA, n. g.

*Mas.* *Corpus* robustum. *Proboscis* obsoleta. *Palpi* breves, validi,

arcuati, ascendentes, articulis indistinctis. *Antennæ* robustæ, simplices, longiusculæ. *Abdomen* longissimum. *Pedes* breves, validi, pilosi; *tibiæ* non calcaratæ. *Alæ* sat angustæ; *anticæ* elongatæ, apice rotundatæ, margine exteriore perobliquo.

*Male.* Body stout. Proboscis not apparent. Palpi stout, curved, ascending, applied to the front, hardly rising to the vertex; joints indistinct. *Antennæ* stout, smooth, rather long. *Abdomen* very long, slightly lanceolate, extending very far beyond the hind wings; apical tuft long, slightly diverging. Legs short, stout, pilose; *tibiæ* without spurs. Wings rather narrow. Fore wings elongate, rounded at the tips; costa straight; exterior border extremely oblique; 3rd inferior vein moderately remote from the 2nd.

189. *ARMIANA LATIVITTA*, n. s. *Mas.* Albida, abdomine fusco, alis anticis strigis duabus basalibus testaceis vitta obliqua latissima pallide cervina puncta elongata nigra includente, alis posticis purpurascenti-fuscis.

*Male.* Whitish. *Abdomen* brown, except towards the tip. Wings mostly brown beneath. Fore wings with two testaceous streaks proceeding from the base, and with a very broad oblique pale-fawn-coloured stripe, which is notched along each side, and contains a line of elongated black points on the veins; a row of pale-fawn-coloured marginal marks. Hind wings purplish brown, excepting the costa and the fringe. Length of the body 12 lines; of the wings 22 lines.

#### Gen. CHATRACHARTA, n. g.

*Mas.* *Corpus* sat gracile. *Proboscis* obsoleta. *Palpi* compressi, ascendentes, sat graciles, articulo 3° non conspicuo. *Antennæ* breviusculæ latissime pectinatæ. *Abdomen* fasciculo apicali parvo subfurcato. *Pedes* læves, breviusculi, sat graciles; *tibiæ* posticæ quadricaratae. *Alæ* breves, latæ, margine exteriore subangulato; *anticæ* costa basi dilatata.

*Male.* Body rather slender. Proboscis obsolete. Palpi compressed, rather slender, obliquely ascending, not rising higher than the vertex; 3rd joint not distinguishable. *Antennæ* rather short, with very long thick-set pubescent branches. *Abdomen* with the apical tuft small, subfurcate. Legs smooth, rather short and slender; hind *tibiæ* with four moderately long spurs. Wings broad, short; exterior border slightly angular in the middle. Fore wings with the costa dilated towards the base; exterior border slightly excavated in front; 4th inferior vein very remote from the 3rd.

Allied to *Parathyris*.

190. *CHATRACHARTA TORTRICOIDES*, n. s. *Mas.* Ochraceo-albida, alis anticis ochraceis nigro subconspersis puncto basali lituraque dicali e strigis duabus undulatis nigris striga costali exteriore nigricante.

*Male.* Ochraceous whitish. Vertex and palpi ochraceous. Fore wings

ochraceous, thinly speckled with black, with a black discal point near the base, and with an exterior blackish discal mark, consisting of two undulating parallel streaks; a blackish costal streak nearer the tip. Hind wings with an ochraceous tinge, and some black speckles along the hind part of the exterior border. Length of the body 4 lines; of the wings 10 lines.

Fam. LIMACODIDÆ, *Duponch.*

Gen. MIRESA, *Walk.*

191. *MIRESA ORTHOSIODES*, n. s. *Mas.* Saturate rufa, alis posticis nigricanti-cinereis, alis anticis nigricante subnebulosis nigro subconspersis gutta discali lineaque submarginali undulata punctulari nigris. *Male.* Deep red. Palpi porrect, short, broad. Antennæ moderately pectinated. Hind wings and underside blackish cinereous. Fore wings rounded at the tips, partly blackish-clouded, thinly black-speckled; discal dot black; an undulating submarginal line of black points; fringe interlined. Hind wings ferruginous brown. Length of the body 4 lines; of the wings 10 lines.

Gen. NYSSIA, *Herr.-Sch.*

192. *NYSSIA CUPREIPLAGA*, n. s. *Mas.* Cinereo-ferruginea, crassa, antennis serratis basi late pectinatis, alis anticis nigro subconspersis linea recta obliqua obscure ferruginea plaga exteriore cuprea. *Male.* Ferruginous, with a cinereous tinge, more cinereous beneath, very robust. Antennæ broadly pectinated to one-third of the length, serrated from thence to the tips. Fore wings acute, very thinly black-speckled, with a straight oblique middle dark-ferruginous line, beyond which there is a cupreous upright patch which is abbreviated in front and extends to the interior angle. Hind wings cinereous, with a ferruginous tinge, densely pilose along the interior border. Length of the body 8 lines; of the wings 16 lines.
193. *NYSSIA CUPREISTRIGA*, n. s. *Mus.* Rufescens, antennis subpectinatis basi late pectinatis, alis anticis nigro subconspersis linea obliqua subrecta ferruginea fascia exteriore cuprea antice abbreviata, alis posticis æneo-testaceis. *Male.* Reddish. Palpi broad, obtuse, black-tipped. Antennæ broadly pectinated to one-third of the length, slightly pectinated from thence to the tips. Fore wings acute, thinly black-speckled, with a ferruginous oblique nearly straight line; an exterior upright cupreous band, obliquely abbreviated in front, occupying the hind part of the exterior border. Hind wings æneo-testaceous, paler along the costa. Length of the body 7 lines; of the wings 16 lines.

This species is very closely allied to *N. cupreiplaga*, but may be distinguished by the narrower and differently formed cupreous mark on the fore wings, and by the darker fringe of the hind wings.

194. *NYSSIA RUDIS*, n. s. *Mas.* Cervina, antennis late pectinatis dimidio apicali nudis, alis anticis squamosis nitentibus linea media recta obliqua obscuriore.

*Male.* Fawn-colour. Palpi obtuse, very broad. Antennæ broadly pectinated to nearly half the length, simple from thence to the tips. Fore wings squamous, shining, with a darker straight oblique middle line. Hind wings a little paler than the fore wings, thickly pilose along the interior border. Length of the body 6 lines; of the wings 14 lines.

195. *NYSSIA CRUDA*, n. s. *Mas.* Cinereo-cervina, antennis basi late pectinatis apice serratis, alis anticis acutis nigro subconspersis bilineatis chalybeo-purpurascente tinctis.

*Male.* Cinereous fawn-colour. Palpi broad, porrect; 3rd joint conical, distinct. Antennæ broadly pectinated towards the base; the branches gradually decreasing in length; apical part serrated. Fore wings very acute, thinly black-speckled, tinged with purplish chalybeous except towards the base, this tinge divided by two nearly straight lines of the ground-hue; costa quite straight; exterior border extremely oblique hindward. Hind wings not paler than the fore wings. Length of the body 6 lines; of the wings 12 lines.

196. *NYSSIA RUBICUNDA*, n. s. *Mas.* Ochraceo-rufa, antennis nudis basi late pectinatis, alis anticis apices versus nigris.

*Male.* Bright ochraceous red. Palpi extremely broad and short. Antennæ broadly pectinated to beyond one-third of the length, simple from thence to the tips. Thorax with a purplish tinge on each side. Wings thinly clothed. Fore wings mostly black towards the tips. Length of the body 4 lines; of the wings 10 lines.

197. *NYSSIA RUBRIPLAGA*, n. s. *Mas.* Ferruginea, crassa, antennis late pectinatis dimidio apicali vix serrato, alis anticis spatio marginali saturate rufo intus linea argentea marginato.

*Male.* Ferruginous, very stout. Antennæ broadly pectinated to almost half the length, hardly serrated from thence to the tips. Wings with a silvery-tipped fringe. Fore wings acute; a broad deep-red space along the exterior border, limited on the inner side by a curved silvery line. Hind wings with the fringe blackish towards the interior angle. Length of the body 4 lines; of the wings 10 lines.

198. *NYSSIA ? VETUSTA*, n. s. *Mas.* Cinereo-fusca, antennis usque ad apices pectinatis, alis anticis rufescenti-ferrugineis nigro subconspersis fascia recta obliqua cana intus concisa extus diffusa puncto discali nigro margine exteriore cinereo.

*Male.* Cinereous brown. Palpi porrect, very broad and obtuse. Antennæ moderately pectinated to the tips. Fore wings reddish ferruginous, acute, thinly black-speckled, with a straight oblique hoary band which is concise on the inner side, and diffuse on the outer side,



where it is accompanied by a blackish shade; discal point black; exterior border cinereous, this hue attenuated hindward. Hind wings with a cinereous fringe. Length of the body 6 lines; of the wings 16 lines.

The structure of this species does not quite agree with the typical form of *Nyssia*.

199. *NYSSIA*? *BIGUTTATA*, n. s. *Fœm.* Cinereo-fusca, alis anticis pallide cervinis, gutta discali nigra, spatio exteriore obliquo fuscescens intus linea nigro-fusca concisa marginato.

*Female.* Cinereous brown, stout. Palpi porrect, very broad and obtuse. Antennæ simple. Fore wings pale fawn-colour, excepting the oblique exterior part, which extends from near the tip of the costa to the middle of the interior border, and is blackish brown and concise along its inner side; discal dot black, rather large. Length of the body 5 lines; of the wings 14 lines.

[To be continued.]

Histological Observations on the Eye of the Cod-fish (*Morrhua vulgaris*), with especial reference to the Choroid Gland and the Cones of the Retina. By T. SPENCER COBBOLD, M.D., F.L.S., Lecturer on Botany, Zoology, and Comparative Anatomy at the Middlesex Hospital College.

[Read March 6th, 1862.]

By introducing observations of this kind to the Linnean Society I am aware that I am treading a well-beaten path; but as there are still many points connected with the minute anatomy of the vertebrate eye which remain to be solved, I trust that the facts and opinions which I proceed to bring under the Society's notice will obtain due consideration.

With the exception of Mr. Nunneley's researches, most of the recent investigations into the minute structure of the eyeball have been made after the organ in question had been steeped for a longer or shorter time in chromic-acid solutions; and from this circumstance I think we have been frequently led into error as regards the precise character of the ultimate elements of the organ, although, in the hands of Hannover, Kölliker, and Heinrich Müller more especially, the relations of the component layers of the eyeball have been most satisfactorily determined.

To take the vitreous humour, for example, it is quite clear that Hannover's views (published in Müller's 'Archiv' for 1845) as to

the densely laminated character of its substance have proved erroneous, and that the numerous layers which his beautiful preparations of the vitreous body showed were only due to the coagulating agency of the strong chromic-acid solutions in which the eyeballs had been kept immersed before the sections were made. At a meeting of the Physiological Society of Edinburgh in 1851, I took occasion, in Dr. Hannover's presence, to point out this circumstance, and also adduced other evidences to show the erroneousness of his conclusions. The well-known fact, that by puncturing the vitreous mass in a fresh state we can draw off, as it were, the great bulk of its fluid contents, is sufficient in itself to demonstrate that the vitreous body is not made up of membranous laminæ; but, at the same time, there can be no doubt, as my own investigations have shown, that the inner layer of the hyaloid tunic sends off a few prolongations into the substance of the vitreous mass. Probably these extensions form the walls of enormously enlarged cells; but this is a point which I have not been able to determine.

The principal points, however, to which I now wish to draw attention are such as have reference to the occurrence of parasitic formations within the cartilaginous matrix of the sclerotic coat, to the structure and functions of the so-called choroid gland, and more particularly to certain artificially produced phenomena in connexion with the large and remarkable twin-cones of the retina. The views which I shall here subscribe in regard to the nature of the choroid gland are directly at variance with the commonly received opinions, and offer, I think, an intelligible explanation in regard to a singularly obscure subject.

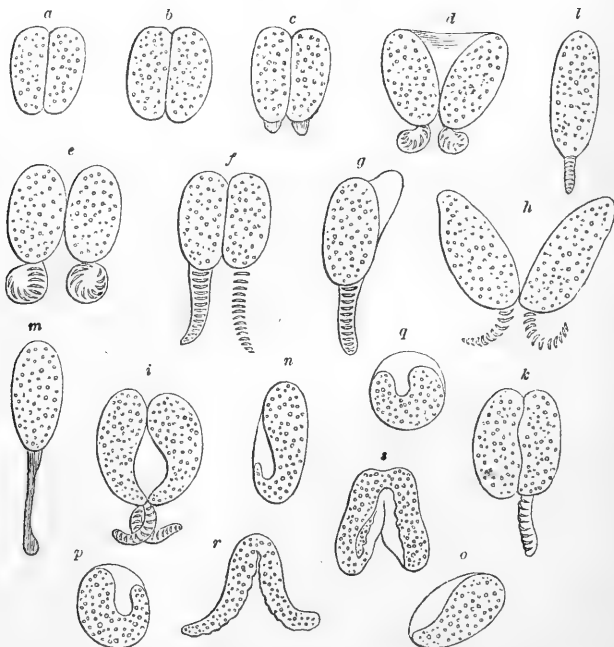
(1.) If the external fibrous and internal separable layers be detached from the true cartilaginous matrix of the sclerotic of the Cod, it will frequently be observed, in large eyes at least, that the latter contains within it certain oval, rounded, and more or less stellate-looking bodies of a dense, milk-white colour. Their size varies from that of a pin's head to that of a pea; and when submitted to high magnifying powers, they are found to contain a multitude of minute cells, which have an average individual measurement of about the  $\frac{1}{4000}$ th of an inch. All of them are oval in shape, and contain double nuclei, placed side by side at one end of the cell-cavity, which also contains a pale-yellow-coloured fluid surrounding the nuclei. So far as I am aware, these bodies have never been described by observers in this country; but they are manifestly the so-called *psorospermia*, which have been carefully investigated on the continent by Müller, Dujardin, Creplin, and others. The

author last named considered them equivalent to the pseudo-naviculæ of *Gregarina*, whilst Dufour provisionally placed them among the Entozoa, with which, however, they have evidently no legitimate connexion. Caustic potass dispels their colour, and, without entirely bursting, they display peculiar jerking movements, apparently due to the escape of sarcode at one or more points; but they do not, nevertheless, undergo any change of form.

(2.) According to the early investigations of Haller, Hunter, Cuvier, and others, the so-called choroid gland is prevalent in osseous fishes generally; and I believe this statement is correct; but their individual opinions as to its nature and function are very various. Hunter thought it muscular; Sömmering doubted whether it were glandular, vascular, or muscular; and Cuvier took up with the notion that it was to be classed with erectile tissues. But what are the facts which microscopical inquiry discloses? If a thick vertical or horizontal section be removed from this gland (which is horseshoe-shaped in the Cod) and placed under the quarter-inch objective, the arterial and venous trunks going to it will be found to divide suddenly into multitudes of minute capillaries, the latter therefore taking their origin from the line of demarcation which indicates the inner border of the so-called gland. The small capillaries will be further found to be intimately blended together by their own walls, and not by the intervention or extension of any fibres from the connective tissues of the choroid membranes. They are all arranged in a simple linear, parallel manner; and their width does not appear to exceed that of the short diameter of the blood-corpuscles, the admeasurements of the latter being about  $\frac{1}{2500}$ th of an inch long, by  $\frac{1}{3500}$ th of an inch in breadth. In fresh eyes the capillaries are always found gorged with blood; and when I recently succeeded in isolating, more or less completely, a few of the vessels of the band, one of them was seen to contain blood-corpuscles arranged in single file. The capillaries are straight and of uniform diameter throughout, and they do not give off any branches or dilatations such as are found to occur in the true erectile organs.

(3.) Some seven or eight distinct nervous layers have been indicated as together constituting the retina; but for all practical purposes I think it sufficient to recognize four, namely, Jacob's membrane, the soft internal layer (consisting of various laminæ of different-sized cells and granules held together by the so-called Müllerian filaments), the fibrous expansion of the optic with its vessels, and, lastly, the thin hyaloidal cellular layer. Confining our

attention to the first only of these complicated layers, I have to remark that in the Cod, as also in its allies, we find Jacob's membrane to consist of rods and cones, the latter presenting the characteristic twin or double form well known to occur in many fishes. In my opinion this twin character is a normal condition; but this view is opposed by Mr. Nunneley, who has arrived at very different conclusions not only in this particular, but also in regard to their size and other easily ascertainable facts. According to my own examinations, the twin-cones of the Cod present an average length of  $\frac{1}{500}$ th of an inch in length, and  $\frac{1}{800}$ th of an inch in breadth; but I have found some only  $\frac{1}{650}$ th of an inch long, and others as much as  $\frac{1}{400}$ th after they have imbibed fluids added to them. In the fresh condition they display the form shown in the accompanying woodcut (a), having, as Hannover has remarked, the shape



Twin-cones of the retina of the Cod, showing the formation of bacillar appendages, and the changes of form which the cones undergo on the addition of water.

of a coffee-berry, the upper or inner pole of the twin-cone being somewhat more broadly truncated than the lower or outer pole,

which is slightly constricted below. Very soon after the commencement of my examinations, oft-repeated, I have observed the twin-cones to alter in shape. The earliest and most constant change simply consists in the swelling out of the individual halves of the twin-cone, and their approximation to a more perfect oval figure (*b*). This occurs before or without the addition of any fluid medium to the slide on which they are placed; and not unfrequently, under precisely the same conditions, we may see minute appendages attached to the lower (or outer in relation to the centre of the eyeball) poles of the twin-cone (as represented at *c*). Further disintegration will subsequently take place, even though no fluid be added; but the changes which thus result accidentally, as it were, are not of that uniform and satisfactory character which enable us to give any opinion as to the probable structure, function, and behaviour of the bodies during life. A very different result, however, happens where we are fortunate enough to secure a fresh eye, in which none of the twin-cones have even begun to disintegrate, and in which, on the addition of water, we may at once observe a series of changes which I believe to be invariable under the same favourable circumstances. The first time I observed these phenomena was at a meeting of the Brighton Microscopical Society, held during the evening of the 6th of December last. On that occasion, and since, I have observed, with more or less completeness, the following changes to take place. The addition of cold water causes a general swelling of the twin-cone, such as I have before referred to as occurring without this agent, and at the same time there commences a bulging at the lower poles of the twin-cone, similar in all respects to that figured at *c*. These changes are, however, more rapid than those described as taking place from disintegration alone, and, what is more important, they are continuously followed by others still more striking and more uniform in character. Thus (as seen at *d*), each half-cone assumes a distinctly oval figure, at the same time enlarging, swelling out, and making efforts, as it were, to detach itself from its fellow. Coordinating with these peculiarities of behaviour, we observe the protrusions at the lower pole of the twin-cone to bulge more and more conspicuously, and in the interior of the sac-like bacillar prolongations thus formed we have distinct evidences of the existence of a filament, which, owing to its very strong refractive power, exhibits a series of dark transverse bands, apparently disposed in a spiral figure. Singular and inexplicable as these phenomena may appear, I entertain no doubt whatever of their

occurrence, and I have the satisfaction of knowing that they were in the first instance witnessed by other microscopical observers. The bacillar prolongations continue to extend themselves; an outer capsule of the twin-cone (represented at *d*), which normally binds the halves together, very soon gives way, and the divisions next exhibit the appearance seen at *e*. In some cases the half-cones do not entirely lose their original truncated figure, and (as at *f*) the bacillar filaments, with their investing sacs, are prolonged downwards and outwards in the form of a cylinder. Most commonly, I might almost say invariably, the ends of the prolongations curve outwards, each in the form of a hook, as shown in all the three last figures alluded to, and still more significantly in the illustration marked *h*, where the capsule of the twin-cone and the sac of the bacillar filaments have altogether disappeared, each half-cone having at the same time undergone a marked change of form. This gradual disappearance of the saccular extension of the twin-cone capsule around the filament may be seen taking place whilst the cones are under examination (as on the right of the cone marked *f*); and now also the two halves frequently separate (as at *l* and *g*), portions of the capsule sometimes remaining partially separated. Occasionally some of these phenomena occur independently, the half-cones remaining united, the central line of separation only becoming uneven or sinuous (*k*); whilst at other times the distortion is so peculiar, that the combined halves resemble a plant-stomate with an interspace between them (*i*). In all cases the bacillar filaments are liable to break up at different places, but they are most commonly detached at their points of connexion with the twin-cone. Whilst watching the cone marked *i*, the decussating appendages here figured floated off, along with the granular particles, which were carried past it in a continuous stream. In one instance only have I observed that great extension of the filament which I take to be the complete unfolding and development of this peculiar appendage; and in this case, only the right half of the cone came under notice (*m*). After the separation of the filaments the half-cones undergo all manner of changes of form, and they ultimately split up longitudinally and disintegrate. Thus, the halves marked *n* and *o* have a regular oval figure, but the granular contents are seen to be enclosed in a separate envelope of a pear-shaped form. At *p* and *q* they have assumed a rounded outline, and at *r* and *s* have broken up lengthwise, leaving in the latter a hollow centre, owing probably to the escape of the less dense albuminous molecular matter which normally occupies

this situation. On the application of acetic acid, they lost their normally plastic character, becoming uneven at the surface, solidified, and brittle, at the same time exhibiting a darker outline, due to an increased power of refracting light; caustic potass, on the other hand, slight discoloured and dissolved them.

### *General Conclusions.*

I. That the opaque, white, stellate cysts which are almost always present in the sclerotic of full-grown Cod-fishes contain psorospermia, or minute cells of a vegetable character. They may be regarded as non-ciliated zoospores, and, as others have supposed, may possibly have some genetic relation with the so-called pseudonaviculæ of *Gregarinæ*. As a group they should be removed both from the Entozoa and Protozoa, and be placed among the Chlorospores, somewhere in the immediate neighbourhood of the Palmellaceæ and Desmidiaceæ.

II. That the so-called choroid gland of the Cod and other osseous fishes is neither glandular, muscular, nor erectile in structure, but is a simple form of vascular plexus, in which the capillaries are in immediate contact with, and parallel to, one another.

In consequence of this arrangement, this falsely so-called gland is in no way connected with the adaptation of the humours of the eye to varying focal lengths, but is rather to be regarded as a specialized organ fitted to diffuse and modify the flow of blood in a position where, from the proximity of the heart, a strong impulse would interfere with the formation of a correct image on the internal lining membrane of the choroid.

The *rete mirabile* of Cetacea, and other similar vascular peculiarities observable in the Sloths, Lemurs, and in the long-necked Herbivora, are analogous formations, concerned in the diffusion and retardation of the circulating fluid for various purposes.

In the active-moving cartilaginous fishes, where no choroid gland exists, the impulse of the circulating current is lessened by other anatomical arrangements, as may be seen, for example, in the Porbeagle (*Squalus cornubicus*), where the arterial jets are broken up by the alternating action of three rows of semilunar valves placed within the bulbus arteriosus.

The fleshy protuberance described by Professor Rymer Jones (in his 'General Outline of the Animal Kingdom') as occurring in the arterial bulb of the Angler (*Lophius piscatorius*) has no existence in nature. The description appears to have been borrowed from Yarrell.

III. The normal condition of the retinal cones in the Cod is double, and the phenomena exhibited by these twin-cones, under the action of water, seem to indicate that the bacillar prolongations (*Zapfenstäbchen*) of the cones are not persistently formed appendages, as the representations of Kölliker, H. Müller, and Nunneley would lead us to suppose, but bear more the character of tactile bodies capable of protruding filaments under the influence of stimuli.

The cones and bacilli of Jacob's membrane are not true nerve-structures in the sense maintained by Kölliker and Müller, neither can they properly be called "percipients of light;" but they are, in point of fact, special tactile organs, like the Pacinian corpuscles of the skin, and are destined to receive and convey impressions produced by pencils of light impinging upon and reflected from the internal limiting membrane of the choroid,—the impressions being subsequently and finally transferred to the true nervous elements of the inner layer of the retina by the intervention of the granular layers, which are held together by the delicate Müllerian filaments.

Although I have arrived at the above conclusion respecting the Pacinian-corpuscular character of the cones from independent and oft-repeated examinations, I may observe that a similar opinion had been previously recorded by Professor Goodsir of Edinburgh, who, from considerations affecting the development of the vertebrate eyeball, goes even further, and asserts that the bacillar layer, with its rods and cones, "belongs morphologically to the transparent humours of the eye."

All observations made on the retina after it has been immersed in solutions of chromic acid, in so far as the intimate histological characters are concerned, should be received with extreme caution, because the normal characters of its component parts are at once destroyed by the addition of coagulating reagents. The same remark is equally applicable to the vitreous body and other soft tissues of the eyeball. Strong acid solutions, however, are useful in determining the relations of the ultimate elements of any given compound tissue, as has been abundantly proved by recent investigations, and more particularly by those of Hannover, Kölliker, and Heinrich Müller.



On the Structure of the Mantle in *Testacella*.

By LOVELL REEVE, Esq., F.L.S.

[Read April 17, 1862.]

AMONG some unpublished drawings of British mollusks obligingly placed at my disposal by the Rev. M. J. Berkeley, F.L.S., I have been interested in finding a figure of *Testacella Maugei* with a different condition of the posterior extremity of the animal to that represented in any previous figure or description. Either the mantle is produced externally on each side for the lateral embrace



of the shell, or a pair of lobes is developed for that portion in connexion with the integuments. Mr. Berkeley informs me that his drawing was made from a living specimen given to him by Mr. Sowerby about the year 1829, captured, he believes, in a garden at Lambeth. "I am certain," he adds, "that it is correct; but unfortunately I can find no description."

*Testacella* is a form of much importance in the molluscan series, as being the only example of a Slug in which the pulmonary sac is situated at the posterior extremity of the animal; and it is the only one of strictly carnivorous habits, burrowing into the ground to a depth of two feet and more, and gorging voraciously upon earthworms more than equal to itself in size. The shell, covering the pulmonary sac, is the first in the testaceous kingdom to be secreted externally, and the first in which an indication is presented of the spiral plan of growth which is gradually developed in the shell of *Daudebardia* and *Vitrina*, and matured in the whorled *Helix*.

Though unknown to Linnæus, *Testacella* was discovered and singularly well observed long before the publication of the 12th edition of the 'Systema Naturæ.' In the Mémoires de l'Académie des Sciences of Paris for 1740 is a letter addressed to M. de Réaumur by M. Dugué of Dieppe, from which the following is an extract. It has been already cited by De Férussac in his 'Histoire des Mollusques' (1819), vol. i. p. 89; but it is necessary here to repeat it.

“Il y a dans cette ville un jardin où se trouve une espèce de Limace, inconnue aux jardiniers du pays. Elle est longue de dix-huit à vingt lignes, et à peu près de la forme des limaçons rouges qui courent sur la terre, et n'ont point de coquille. Elle se terre à la façon des vers et ne sort que la nuit. Elle porte sur la croupe une partie semblable à un ongle, placée comme il l'est au bout du doigt, et pour le moins aussi dure. Tout l'animal est si dur, qu'on a peine à le couper avec un couteau. On l'a enfermé dans un pot, avec des vers de terre, longs de trois ou quatre pouces et gros comme une plume; il s'en nourrit, quoique beaucoup moins fort qu'eux en apparence. Il met environ quatre ou cinq heures à en avaler un entièrement; mais ce long temps ne lui fait point hasarder de perdre sa proie; quand une fois il l'a saisie par un bout, elle ne peut plus lui échapper, quelques efforts qu'elle fasse. Il dépose dans la terre ses œufs, parfaitement ronds d'abord, et qui ne sont qu'une petite pellicule remplie d'une humeur visqueuse; mais au bout de quinze jours, ou un peu plus, l'humeur s'épaissit, la forme ronde se change en ovale, et la Limace éclôt comme un poulet.”

No observation since made on the *Testacella* has surpassed this of M. Dugué in accuracy; but as only a very imperfect system of nomenclature was then in use, it was not until sixty years later that the *Testacella* appeared in M. Cuvier's 'Leçons d'Anatomie Comparée' (vol. i. tab. 5) with a name. Specimens had been found in Brittany and in the South of France, and the animal was further described in detail by M. Faure-Biguet in the 'Bulletin des Sciences de la Société Philomatique' of Paris for 1801, and by Cuvier in the 'Annales du Muséum' for 1804. No mention is made in either of these descriptions of the external lateral lobes portrayed in Mr. Berkeley's drawing, nor is there any indication of it in the figures of the animal and its anatomy reproduced in 1820 by M. de Férussac (Hist. Moll. pl. 8. f. 4 to 12), nor in the more recent 'Monographie' of MM. Gassies and Fischer, published in 1856. M. de Férussac describes the mantle as being entirely concealed beneath the shell; but the remark is accompanied with the statement, thought to be confirmed by Mr. Woodward (Manual, p. 465), that it is susceptible of being extended over the whole body.

“Le petit manteau, susceptible d'entourer tout le corps, est, cependant, entièrement caché sous le test, qui est dix fois moins long que lui; il est divisé en plusieurs lobes, dont le postérieur et latéral du côté gauche est caché dans la rainure où s'implante la

clavicule, et recouvre par son développement la partie postérieure du corps, comme un dé qui entoure le bout du doigt; l'antérieur et le latéral du côté opposé achèvent d'entourer le corps."

And again:

"Quand les *Testacelles* sont surpris par la sécheresse, nous avons dit qu'ils s'enveloppaient entièrement avec leur manteau. Ce manteau très gélatineux, et dont on ne conçoit pas l'entière retraite sous une assez petite coquille, entretient ces animaux, au milieu de la terre desséchée, dans une sorte de fraîcheur et d'humidité qui paroît leur être indispensable pour vivre. Lorsqu'ils sont ainsi surpris par la sécheresse, ils sont à la vérité extrêmement contractés, mais cet état de contraction augmente l'épaisseur du corps, quoiqu'il diminue de moitié sa longueur totale. Ainsi ce manteau a toujours besoin d'une grandeur considérable, relativement à celle du test. Celui-ci est d'ailleurs si bien collé sur l'animal, qu'il fait présumer que ce manteau n'est qu'une tunique très mince sous la coquille, dont le tissu cellulaire jouit de la faculté d'absorber et de conserver les particules aqueuses de l'air lorsqu'elle est développée. La configuration de ce tissu, examinée avec une forte loupe, semble confirmer cette opinion."

*Testacella* has been described and figured since Férussac's time by all our best authorities on the subject—by Sowerby in 1830, Gray in 1840, Forbes and Hanley in 1853, and by Moquin-Tandon in 1855; but no mention is made by either of these naturalists of this phenomenon of the enlarged expansion of the mantle; M. Moquin-Tandon, on the contrary, says, "M. Férussac se trompe, quand il suppose le manteau très-extensible et pouvant se dilater assez dans certaines circonstances pour recouvrir tout l'animal." Mr. Woodward, in a supplementary note to his 'Manual of Recent and Fossil Shells,' concluded in 1856, says,—“During winter and dry weather the *Testacella* forms a sort of cocoon in the ground by the exudation of its mucus. If this cell is broken, the animal may be seen completely shrouded in its thin opaque-white mantle, which rapidly contracts until it extends but a little way beyond the margin of the shell.” An accompanying wood-engraving represents *T. Maugei* (found by Mr. Cunningham in fields near Devizes) just disturbed from its sleep.

By far the most complete monograph of *Testacella* is that published the same year by MM. Gassies and Fischer. M. Gassies kept a vivarium in the neighbourhood of Bordeaux, in which he bred specimens of both *T. haliotidea* and *F. Maugei*; and little doubt

remains, from his observations, that the thin white cocoon which has been taken for an expansion of the mantle is simply a pellicle of mucus, secreted during hibernation or rest.

The terminal processes represented in Mr. Berkeley's drawing as embracing the sides of the shell appear to be a different structure from this cocoon-pellicle. De Férussac, however, describes the mantle as being divided into *several* lobes; and it is to be hoped that some light may be thrown on this structure by further observations. Originally a native of the Canary Islands, *Testacella* has become freely acclimatized in Europe through being imported with plants; it is mostly found in the neighbourhood of maritime cities, and generally in the vicinity of the hothouse or conservatory.

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On the Abnormal Habits of some Females of the Genus *Orgyia*.

By H. T. STANTON, Esq., F.L.S.

[Read May 1, 1862.]

THE genus *Orgyia* is a well-known genus of Moths, of the family *Lipariidæ*, in the group of the *Bombycina*.

The males have well-developed wings, and, though of rather a slighter habit, are not particularly different from the males of the neighbouring genera; but the females at once attract attention by the rudimentary condition of their wings and by the large size of their bodies.

One of the best-known of the genus is *Orgyia antiqua*, which is excessively plentiful in the streets of London, the male being seen flying freely about on bright days in July and August. The female may often be noticed sitting on the outside of the cocoon in which it has passed its pupa-state of existence. After copulation, the female deposits her eggs on the surface of the cocoon.

The Rev. Lansdown Guilding has stated, in the 15th volume of the Transactions of this Society (p. 372), that the female of *Orgyia antiqua*, "*copula juncta*, enjoys with its partner the pleasures of the open fields;" but I am certainly not aware that such an observation has been confirmed, and, looking to the disproportion of the size of the sexes and the utter incapacity of the female to assist in flight, it would appear physically impossible. Indeed, I believe that the female rests on the cocoon whilst receiving the advances of the male, that she then deposits her eggs on the outside of the cocoon; and not till her mission is completed does she drop off the cocoon, in a dying state, a shrivelled, empty egg-bag.

The female of our common *Orgyia antiqua* has hitherto been considered a fair type of a female of the genus *Orgyia*; but recent observations, joined to some which were made nearly thirty years ago, have shown that this assumption was unfounded. Before, however, proceeding to notice the abnormal habits of some other females in the genus, it may be advisable to glance at some of the allied genera, as these new observations on habit are mainly interesting as supplying an unexpected link between genera hitherto deemed far more widely separated.

The insects, therefore, which I must now briefly bring before the notice of this Society are the *Psychidæ*. The *Psychidæ*, though, for convenience of study, we are very apt to treat them as a whole, are really divided into two groups, one of which belongs to the *Bombycina*, the other to the *Tineina*. Some systematizers place the whole of the *Psychidæ* amongst the *Tineina*; but the very Bombyciform appearance of the males of some of the larger species renders this step one which is very difficult to follow. In my investigation of the *Tineina*, I have placed two genera only of these insects in that group, *Talæporia* and *Solenobia*, leaving the remaining genera (*Epichnopteryx*, *Fumea*, *Psyche*, and *Oiketicus*) to rank amongst the *Bombycina*. Professor Westwood, in the 'Proceedings of the Zoological Society' (1854, pp. 240, 241), has, in like manner, maintained the separation of the group, and unhesitatingly refers the genera *Psyche* and *Oiketicus* to the *Bombycina*. In my remarks on the genera *Epichnopteryx*, *Fumea*, and *Psyche*, I have followed the very able and philosophical treatise of Dr. Hofmann, which appeared in the Berlin 'Entomologische Zeitschrift' for 1860.

All the species of the entire group of *Psychidæ* are, in the larva state, case-bearers, from the *Oiketicus* with a case two or three inches long, to the smaller *Solenobia*, of which the case is not above  $2\frac{1}{2}$  lines in length; and the structure and habits of the larvæ are all very similar: but in the females of the group we find a singular diversity; and I will therefore proceed to notice the differences presented by the females in these genera, commencing with the genus *Solenobia*, which comprises the smallest species, and working upwards to the genus *Oiketicus*, which contains the largest.

**SOLENOBIA.** The female of this genus has its legs, antennæ, and eyes well developed; when it emerges from the pupa, the pupa-skin is protruded from the case, and the excluded female

sits on the outside of its case. After copulation, it lays its eggs in the interior of the empty case.

It is in this genus that we meet with at least one species, *Solenobia Lichenella*, of which the females, without copulation, lay fertile eggs. This fact was distinctly announced by Von Siebold in 1851, in a brief memoir in the Silesian 'Bericht über die Arbeiten der Entomologischen Sektion im Jahre 1850,' of which I gave a translation in the first volume, new series, of the 'Transactions of the Entomological Society of London,' p. 234. Von Siebold then arrived at the conclusion "that *Solenobia lichenella* is a *sexless nurse*, since the larvæ of that case-bearer produce nothing but females, and always again only females, which, *sine concubitu*, lay eggs, from which afterwards larvæ actually escape."

I believe now that most of those who have worked at this group of insects have had instances of *Solenobiæ*, collected in the larva state, which have produced females, which, kept in a box quite by themselves, have laid eggs from which young larvæ have proceeded.

**TALÉPORIA.** The female in this genus is quite similar in habit and structure to the female of *Solenobia*, only more robust,—the generic distinction being furnished by the male, and by the different form of the case of the larva. However, in *Taléporia*, we have no instance recorded of *sexless nurses*.

**EPICHOPTERYX.** The female of this genus has likewise fully developed legs, antennæ, and eyes; but, unlike the preceding genera, when it emerges from the pupa, the pupa-skin is left in the interior of the case, but the female comes out and sits on the end of the case, awaiting the arrival of the male: after copulation, the female, by means of its long ovipositor, deposits its eggs in the interior of the empty pupa-skin, which had been left in the case.

**FUMEA.** The females of this genus offer some little variety. In some species, as *Plumella*, the legs and antennæ are scarcely developed; whereas in *Bombycella* the legs are distinctly jointed. The females of this genus never leave the case: copulation is effected by the male introducing the end of its abdomen into the case tenanted by the female.

The female of *Fumea Sieboldii* will just protrude its head from the open end of its case, but never comes quite out of its pupa-skin, and the dark-brown skin of the head of the pupa clings to the head of the imago: immediately after copulation, it commences depositing its eggs in the interior of the empty pupa-skin; and when

it has completed its task, it drops out of the case, an empty shrivelled skin.

Intermediate, perhaps, between *Fumea* and *Psyche* comes the singular *Psyche? Helix*, noticed by Von Siebold. This, again, is a *sexless nurse*, of which the male is hitherto unknown. The larvæ are common in many parts of Germany, but never produce anything but vermiform females, which deposit eggs which are always fertile.

**PSYCHE.** The females are vermiform, with the legs extremely small and rudimentary, hardly perceptible antennæ, the parts of the mouth very ill developed, and imperfect eyes. It never quits the case, nor comes quite out of the pupa-skin; it only slightly protrudes its head from the open end of the case whilst awaiting the approaches of the male. Copulation is effected by the male thrusting the extremity of its abdomen into the case of the female, after which operation the female deposits her eggs in the empty pupa-skin, imbedding them in layers of wool, and filling the pupa-skin so tightly that, except for the opening at the anterior end, it might pass for an undeveloped pupa.

Such pupa-skins may occasionally have been collected by mistake for pupæ, and the subsequent exclusion of young larvæ would tend to spread the idea that the female bred from the pupa collected had, without impregnation, laid fertile eggs. Von Siebold, when first he turned his attention to the subject, received numerous notices from different quarters of females of the genus *Psyche* producing young without previous copulation; but in none of the known species (excepting the anomalous *Psyche? Helix*) has this been confirmed.

**OIKETICUS.** This genus was established by Lansdown Guilding in the 15th volume of the 'Transactions' of this Society (p. 373), and has since been the subject of a paper by Professor Westwood in the 'Proceedings of the Zoological Society' (1854, p. 219). The female is vermiform, with legs, antennæ, and eyes very ill developed: in some species the legs are so rudimentary as to be little more than perceptible, whereas in *Oiketicus Saundersii* the legs, though very short and little serviceable, are distinctly articulated.

The female never quits the case: copulation is effected by the male inserting the extremity of the abdomen into the interior of the case of the female. "After impregnation," observes Lansdown Guilding, "the female begins to fill the bottom of its puparium with her ova, closely packed in the down rubbed from her body, and then,

reduced to a shrivelled morsel of dried and scarcely animated skin, drops out of the case and dies."

Having now gone through the various genera of the *Psychidæ*, I return to the genus *Orgyia*. The abnormal habit of the females which I have thought it would be interesting to bring under the notice of this Society is this:—

*In many species of the genus Orgyia the female has ill-developed legs and antennæ, and never quits the cocoon.*

This statement rests on a series of distinct observations made on different species by various entomologists; and it is not till we collate these recorded observations that we perceive how general is this peculiar habit.

**ORGYIA RUPESTRIS.** In the 'Annales de la Société Entomologique de France,' tome i. (published in 1832), we find, at p. 275, a description of this species by Rambur, in a List of Corsican Lepidoptera, with descriptions of some new species. He thus notices the female:—

"The female is nearly apterous, its wings being reduced to two very minute velvety scales. The whole body is covered with whitish down; it is little more than a bag quite filled with eggs. The parts of the chrysalis-skin almost always remain on the head and the neighbouring parts of the body.

"This female, whose existence is confined to the single act of reproduction, does not come out of its cocoon, from which it protrudes its anus so that the male may copulate with it. That done, it fills its cocoon with its eggs intermixed with down, and covers the entire mass with a strong bed of down. After the eggs are deposited, one can scarcely find the remains of the body. The Count de Saporta has observed similar manners in *Orgyia Trigotephras*, in the neighbourhood of Aix." These observations of the Count de Saporta, though made previously to those of Dr. Rambur, were published two years later.

**ORGYIA TRIGOTEPHRAS.** A notice of this species, by the Count de Saporta, appears in the 3rd volume of the 'Annales de la Société Entomologique de France,' p. 183, published in 1834. After noticing that the male perfect insect comes out of its cocoon like all other Lepidoptera, he observes:—

"It is not so with the female, which is covered with a white down, and is entirely destitute of wings;" "ses antennes, très-courtes, ne sont point visibles" (a sentence I find difficulty in translating); "and its legs even are so short that they can be of



no further use to it than to enable it to cling to the interior of its cocoon, which it cannot quit. Its first operation, after it is hatched, is to form a small hole at the end of its cocoon, opposite the lower part of its abdomen, which it agitates briskly or even protrudes a small portion at the approach of the male. The latter, provided with a fine sense of smell, hastens from a distance, and, seated on the cocoon, completes the act of copulation, which takes place through the hole made in the cocoon. This fact is peculiar to this species\*, and entirely new in the history of Lepidoptera; but it is compulsory on this *Bombyx*, from the peculiarly inert organization of the female. Copulation lasts a few minutes, after which the male retires; but, from being active and lively as he was, he becomes heavy and dull. The female, after copulation, first proceeds to stop up the hole in the cocoon, and then immediately proceeds to lay her eggs, which she arranges in layers intermingled with white hairs from the abdomen. The laying of eggs lasts several days, during which, if I may use the expression, she literally dissolves into eggs; for after the eggs are all laid, the female herself has disappeared, or is at least reduced to nothing. The cocoon is converted into a bagful of eggs, in which one would have some difficulty in finding the fragments of the small head of the female Moth, which is all that remains of her."

ORGYIA ERICÆ. In the 'Stettin Entomologische Zeitung,' 1858, p. 349, is a notice of this insect by Franz Schmidt. The writer seems perfectly unacquainted with the previous observations of French entomologists. He observes:—

"The male flies often briskly in the day. The female has probably a peculiarity of extreme interest. Those I had never came out of the cocoon; and when I had waited past the time for its metamorphosis and then examined the cocoon, I regularly found the creature completely developed and uninjured, but dead. On account of the distance of the locality and the scarcity of the larvæ, I had only an opportunity of observing this fact eight or ten times, and it might be some extraordinary accident; but I am of opinion that such a number of occurrences is sufficient to arrest the attention, though perhaps not sufficient to allow us to accept this observation as the rule. In all the authors within my reach I have sought in vain for any explanation: if any other entomologist can enlighten me on the subject, I shall be very glad; if not, I hope in time myself

\* This memoir was written before M. Rambur had discovered an analogous species in Corsica, the habits of which he described in the 'Annales de la Société.'

to work out the certainty of the fact. Should the fact be confirmed and the cause be ascertained, it would be important for the explanation of the mysterious mode of copulation amongst the *Psychidæ*, in which, as is well known, the female never leaves the case. The male of *Orgyia Ericæ*, immediately after exclusion from the pupa, becomes very uneasy in captivity, and flies about incessantly; hence it would probably not be difficult to obtain copulation in this species, if one could collect both sexes in some plenty."

In a notice on entomological excursions near Antwerp, by Messrs. Fologne, Mors, & Weyers, published in the 5th volume of the 'Annales de la Société Entomologique Belge,' we find, at pp. 48, 49, a brief notice of *Orgyia Ericæ* :—

"M. J. Colbeau, who had collected many larvæ of this species at Genck on the 23rd July, has succeeded in breeding a series. We observed, with him, that the apterous females which are hatched remain most frequently in the cocoon which contains the chrysalis, and deposit their eggs in the interior. On the contrary, the females of *Orgyia antiqua* emerge from the cocoon, and then deposit their eggs on its exterior surface."

I wrote to M. Fologne to inquire if any further observations had been made on this species; and he replied that, "since the above note had been written, they had found the larvæ of *O. Ericæ* rather plentifully towards the frontiers of Holland, and that Dr. Breyer and he had observed that most frequently the females only opened the anterior ends of the chrysalis-skin, without coming quite out of it. Dr. Breyer had even remarked that the females turned round in the chrysalis-skin, so that the anus protruded from the open anterior end of the pupa-skin; that copulation then took place, and the female proceeded to deposit her eggs in the chrysalis-skin and in the cocoon."

**ORGYIA DUBIA.** In the first portion of the 'Stettin Entomologische Zeitung' for the present year (p. 154) is a notice by H. Christoph, of Sarepta, on *Orgyia dubia*, from which I quote as follows :—

"In the 'Stettin Entomologische Zeitung,' 1858, p. 344, Herr Franz Schmidt of Wismar describes the habits of some Lepidoptera, and amongst them those of *Orgyia Ericæ*. Herr Schmidt observed that, in breeding this creature, the ♀ never came out; and he wishes for further information on this peculiarity.

"Though it was long before I had an opportunity of reading his

remarks, and though I have allowed so long a period to elapse, yet I believe I ought not to keep back my observations on the, at any rate, quite analogous mode of copulation of *Orgyia dubia*, since possibly nothing thereon may yet have been published by German entomologists.

"I have never had an opportunity of observing *O. Ericæ*, and can consequently say nothing respecting that species; but it would seem to me that the same thing takes place with *O. Ericæ* as with *O. dubia*, which is common here.

"I forbear from giving a complete biology of this Moth, as superfluous, and I only remark that, as in all the *Orgyia*, the female [larvæ] are distinguished from the males by their greater size. Usually I do not take the trouble, when rearing them, to separate the male larvæ; and hence I have to be particularly attentive at the time of their exclusion, in order to secure them uninjured. The female larva forms a cocoon very roomy for its size, in which the female perfect insect bursts open the thin pupa-skin, without, however, being in a condition to remove it from the head. I certainly know of no more helpless creature: the head and antennæ are so small and inconspicuous that they can only be perceived with difficulty; the legs are so feeble and so very short (much shorter than those of the larva) that the insect cannot use them at all. In fact, we have here little else than an abdomen full of eggs, which the creature can scarcely move: any violent agitation is not to be thought of. The female never leaves its cocoon, and closes, in its habitation (which will soon become its coffin, unless some amorous male takes pity on it), in lonely and joyless state, its short life, yet not without at least depositing some of its numerous white eggs. These soon shrivel, since they are unfertilized.

"The lively male, on the other hand, displays, soon after its exclusion, a quite peculiar activity in order to accomplish its life's mission. Often before half an hour has elapsed after its exclusion and complete development, it begins to seek eagerly for a consort. It soon scents out the thoroughly closed habitation of a female, settles on it, and seeks for the most convenient place for penetrating into the maiden's apartment. It soon discovers the right place at the most accessible end of the pupa, at the place where usually the moths make their escape. With indefatigable perseverance and haste it now bores with head and legs, afterwards helping itself with its wings into the cocoon, which generally happens after half-an-hour's hard work: copulation then takes

place within the cocoon, and lasts about half a day. I have unfortunately forborne from disturbing the privacy of the matrimonial joys, but believe that there is nothing new to be observed.

"I can only state that at last the male reappears in very desolate condition, and then has no long prospect of life. In my cages they lived, at most, for only two days after the copulation. The female does not wait long before she deposits her eggs in the cocoon, and then dies."

We have now traced the peculiar habit of the female not quitting the cocoon in four species—*rupestris*, *Trigotephras*, *Ericæ*, and *dubia*. Now, if *Corsica* and *splendida* be referred as varieties to *rupestris* and *dubia* respectively, we have but seven species of *Orgyia* in Europe; and of one of those, *O. aurolimbata*, the female is unknown; hence, out of six species, the abnormal habit prevails in four,—*Orgyia antiqua* and *O. gonostigma* (the only two yet known to occur in this country) being the only species in which the female quits the cocoon and deposits the eggs outside it.

Now, in this habit of the greater number of our European species of *Orgyia* what an approach we have to *Oiketicus* and *Psyche*! The genera are still widely separated in the larva state; for all the larvæ of *Orgyia* are hairy, gaily ornamented with tufts of hair, whereas the larvæ of *Oiketicus* and *Psyche* are naked, and have their ugly bodies protected and concealed by the cases which the larvæ construct. But in the imago state we have this important coincidence: the only genera of Lepidoptera in which the female never comes out of the abode of the pupa, but there awaits the approaches of the male, are *Orgyia*, *Oiketicus*, *Psyche*, and *Fumea*.

I have spoken only of the European species of *Orgyia*, but I believe it will be found that a similar peculiarity prevails amongst extra-European species. In the collection of the British Museum I have only noticed females of two species of this genus from extra-European localities. One of these, *O. leucostigma* from Nova Scotia, appears to belong to the same group as *O. antiqua*; and I fancy, from the development of the legs and antennæ of the female, that she leaves the cocoon. The other species, *O. australis*, from New Holland, has the female comparatively undeveloped, and I should imagine that she does not quit the cocoon.

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Observations on the Choice of Food in the Cod and Ling. By  
WILLIAM LAUGHRIN, A.L.S., of Polperro.

[Read June 19, 1862.]

FOR a considerable time I have been in the habit of employing the favourable opportunities which a residence in this place has afforded me in examining the stomachs of fishes caught with a line, for the purpose of discovering the kind of food on which they live in the ocean, and especially that I might procure an insight into the sorts to which, in the midst of abundance, they are accustomed to give the preference; and I beg leave to communicate to the Linnean Society one or two of the results of my researches as applied more especially to two species of the family of Codfishes. For the sake of accuracy, I think it desirable that my observations on some other kinds of fishes should be held in reserve for a time, in order that further research may enable me to speak with a higher degree of confidence regarding them.

Within a certain range of the ocean, there are few fishes which are marked with greater eagerness after food than the Cod, Ling, and Haddock; and, like others of the same family which are furnished with a barb below the lower jaw, their search after prey is for the most part limited to the bottom. At first view of the contents of their stomachs their eagerness for food appears to be indiscriminate, at least for such objects as they are able to swallow whole; for it does not appear that either of them possesses the power of biting off a portion of any substance they might be disposed to feed on. From the appearance of their mouths, also, it might be concluded that they possess but little, if any, sense of taste. In the matter of choice as regards food, the Codfish and Haddock are much alike, as I conclude from having found in them the various kinds of stalk-eyed Crustaceans usual in our waters, with a few exceptions, as well as shell-fish and encrusting corals, the latter being generally the various sorts of *Lepralia* that have spread themselves over the stones lying on the bottom where these fishes haunt; and there is reason to believe that when this animal crust has become digested, the stones are thrown up from the stomach by a voluntary action of the animal. An object sometimes found in the stomach of the Cod is also a kind of *Aphrodite*, and I have felt convinced that two species of these animals are sometimes met with. But what has particularly attracted my notice is the abundance of Crustaceans, both as regards species and individuals, found in the Cod and Haddock, with the even

more surprising fact that, ravenous as the Ling is known to be, not a single instance of a Crustacean animal have I met with in its stomach. Entire fishes of a variety of kinds are of very frequent occurrence; and it was but lately that seven Plaice, of which the smallest measured six inches in length, and the largest ten, were found in the stomach of a Ling of moderate size. The following list of the stalk-eyed Crustaceans which I have met with in the stomachs of the Cod and Haddock (and some of them in considerable numbers) will bear witness to the large number of these animals which exist in the ground frequented by the fishes referred to, at the Cornish entrance to the British Channel.

List of Crustaceans found in the stomach of the Cod:—

|                                |                                             |
|--------------------------------|---------------------------------------------|
| <i>Achæus Cranchii.</i>        | <i>Inachus Dorhynchus.</i>                  |
| <i>Alpheus ruber.</i>          | —— <i>leptochirus.</i>                      |
| <i>Ateleocyclus heterodon.</i> | <i>Munida Rondeletii.</i>                   |
| <i>Cancer Pagurus.</i>         | <i>Nika Couchii.</i>                        |
| <i>Corystes Cassivelaunus.</i> | —— <i>edulis.</i>                           |
| <i>Eurynoma aspera.</i>        | <i>Pagurus Bernhardus.</i>                  |
| <i>Galathea Andrewsii.</i>     | <i>Portunus arcuatus.</i>                   |
| —— <i>dispersa.</i>            | —— <i>corrugatus.</i>                       |
| —— <i>squamifera.</i>          | —— <i>marmoreus.</i>                        |
| —— <i>strigosa.</i>            | —— <i>pusillus.</i>                         |
| <i>Gebia deltura.</i>          | <i>Scyllarus arctus</i> (a single example). |
| —— <i>stellata.</i>            | <i>Squilla Imantis.</i>                     |
| <i>Gonoplax angulata.</i>      | —— <i>Desmarestii.</i>                      |
| <i>Hyas coarctatus.</i>        | <i>Stenorhynchus Phalangium.</i>            |
| <i>Inachus Dorsettensis.</i>   |                                             |

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Observations on some Skulls from Ceylon, said to be those of Veddahs. By GEORGE BUSK, Esq., F.R.S., Sec. L.S.

[Read March 20, 1862.]

SOME of the aboriginal or supposed aboriginal inhabitants of Ceylon, now for the most part confined to the Hill-districts of the island, are known under the name of Veddahs, or Vaddahs. With respect to their origin and relations we are much in the dark. The skulls belonging to this people (exhibited at the meeting) consist of four (two, apparently, of young subjects) recently sent from Ceylon to Dr. Hooker by Mr. Thwaites, and two belonging to Dr. Stephen Ward. Besides these, there is a single cranium of the same race in the Museum of the Royal College of Surgeons, and seven or eight in the extensive and valuable craniological collection of Mr. J. Barnard Davis, which he has kindly allowed me fully to examine and measure. From this

number it seems possible to arrive at some notion of the characteristics of the Veddah cranium.

For the purpose of comparison, there are placed on the table the skulls of a Malay from Singapore, of two Polynesian Malays, of an Australian, of two African intratropical negroes, and some European skulls.

On comparison with these, it appears that the Veddah skulls are remarkable for their small size and lightness, more than for any particular conformation. They are orthognathic, dolichocephalic (·739); and their chief peculiarity appears to be their great height as compared with their breadth. In general form they show no resemblance to either the Malay, Australian, or Negro. Their real relations may probably be found among some of the Hill-tribes of intertropical India. The following tables are exhibited to show the mean dimensions of the crania of some of the different races of mankind, taken however from no very large numbers, and therefore liable to future alteration.

|                      | Euro-<br>pean. | Extra-<br>tropical<br>Negro. | Tropical<br>Negro. | Austra-<br>lian. | Hindoo. | Veddah. |
|----------------------|----------------|------------------------------|--------------------|------------------|---------|---------|
|                      | nches.         | Inches.                      | Inches.            | Inches.          | Inches. | Inches. |
| Length .....         | 7·23           | 7·12                         | 7·15               | 7·15             | 6·64    | 6·56    |
| Breadth .....        | 5·56           | 5·46                         | 5·12               | 5·19             | 5·28    | 4·85    |
| Height .....         | 5·65           | 5·73                         | 5·45               | 5·32             | 5·50    | 5·40    |
| Circumference .....  | 20·60          | 20·50                        | 19·81              | 19·30            | 19·12   | 18·50   |
| Mean general dimens. | 39·04          | 38·81                        | 37·53              | 36·96            | 36·54   | 35·31   |

The relative proportions of the three regions of the cranium taken in a mode presently to be described, in the different races compared, might be expressed numerically as under:—

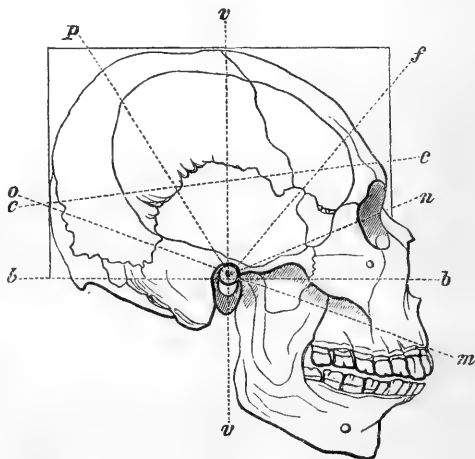
| Region.         | Euro-<br>pean. | Extra-<br>tropical<br>Negro (3<br>cases only). | Tropical<br>Negro. | Austra-<br>lian. | Hindoo. | Veddah. |
|-----------------|----------------|------------------------------------------------|--------------------|------------------|---------|---------|
| Frontal.....    | 30·63          | 29·73                                          | 28·94              | 28·90            | 28·58   | 27·57   |
| Parietal .....  | 28·77          | 28·66                                          | 27·80              | 26·90            | 28·47   | 25·95   |
| Occipital ..... | 24·29          | 25·33                                          | 23·92              | 23·33            | 23·18   | 22·23   |

The mean dimensions of an Andaman Islander's skull, exhibited at the Ethnological Society by Prof. Owen, was 35·0 inches. The Veddah skulls, therefore, estimated in this way, would appear to be amongst those of the lowest cranial type, being smaller even than those of the Bosjesmen, to judge from the crania belonging to that race in the Museum of the Royal College of Surgeons.

The mode in which were taken the different measurements from

which the preceding Tables were drawn up may be explained as under, and will be better understood by reference to the accompanying diagrams. The measures represent simply comparative and by no means absolute values, and are merely therefore designed to facilitate the ready comparison of one set of crania with another, first, with respect to their mean general dimensions; and second, with respect to the relative dimensions of the three cerebral regions, so far as these can be ascertained simply by external measurements. The first object is sought to be attained by taking the measure of the cranium in *length*, *breadth*, *height*, and *circumference*; and the second, by certain measurements restricted to each region respectively, as indicated by the

Fig. 1.



1. *Length*, measured from the glabella to the furthest point of the occipital. (Fig. 1.)

Fig. 2.

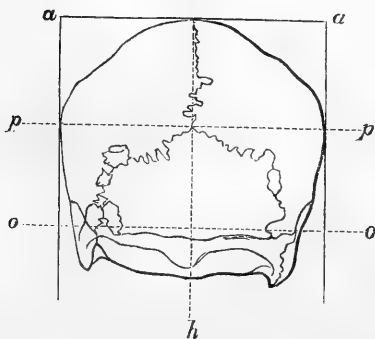
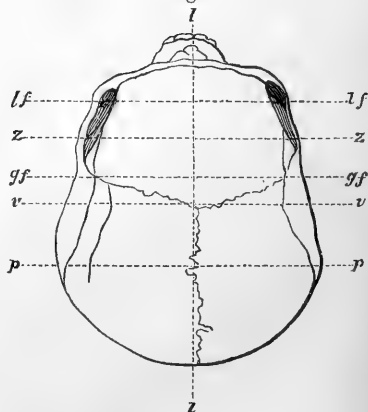


Fig. 3.





2. *Breadth*, taken wherever it is found to be placed, sometimes higher, sometimes lower. (Fig. 2.)

3. *Height*, measured from the level of the foramen magnum to the highest part of the vertex.

4. The least *frontal* breadth, measured usually immediately behind the external orbital process (*lf*, fig. 3).

5. The greatest *frontal* breadth, measured at the point where it exists, which corresponds most usually with that where the temporal line crosses the coronal suture (*gf*, fig. 3).

6. The *parietal* breadth, measured between the centres of the parietal bones (*p*, fig. 3).

7. The *occipital* breadth, taken between the external angles of that bone (fig. 3).

These last four measurements represent, however, only the chords, as it were, of the respective arcs above them; the arcs themselves are roughly estimated by the distance over each arc from the middle of one external auditory opening to that of the other; and these measures may be termed,

8. The *frontal* transverse arc. 9. The *vertical* transverse arc.

10. The *parietal* „ „ 11. The *occipital* „ „

The directions in which they are taken, by means of a graduated tape, are shown in the dotted lines *f*, *v*, *p*, *o*, in fig. 1. But in order to render the measurements of the three regions still more complete, it is necessary to ascertain, 1st, the length in an antero-posterior direction of each region, and, 2nd, the perpendicular depth, as it were, of the three cerebral lobes. The latter object is attempted by measuring the distance between a point corresponding with the *pons Varolii* to the surface of the skull in a straight or radial direction; and these measures are thus taken:—If a thin wire be passed straight through the middle of the auditory opening, and made to perforate the inner wall of the tympanum, it will enter the cavity of the cranium by the internal auditory opening, and of course pass out on the opposite side in the same way. In doing this, it would pass pretty nearly through the centre of the *pons Varolii*. Now, if an instrument be so constructed as to have a conical plug capable of being introduced into each of the external auditory openings, and fitted to move up and down on the branches of an instrument constructed upon the plan of a shoemaker's gauge, the distance from the central point in question = the centre of the *pons* will be measured, including the thickness of the cranium, by the distance of the centres of the plugs from the stem of the instrument, when that is made to touch any part of the periphery

of the skull, as may be seen in Fig. 2, where the outer square lines may be taken to represent the stem and branches of the craniometer, the radius sought being the distance between the lines *o o* and *a a*. These radial measurements will be taken in the same directions as the transverse arcs just described, and are termed respectively—

- |                                |                                 |
|--------------------------------|---------------------------------|
| 12. The <i>frontal</i> radius. | 13. The <i>vertical</i> radius. |
| 14. The <i>parietal</i> „      | 15. The <i>occipital</i> „      |

The longitudinal dimensions of the regions are estimated by a graduated tape, stretched from the fronto-nasal suture to the posterior margin of the foramen magnum, the distance being subdivided into,

16. The *frontal* longitudinal arc, terminating at the *coronal* suture.

17. The *parietal* longitudinal arc, corresponding in length to the sagittal suture ; and

18. The *occipital* longitudinal arc, or the distance from the same point to the *foramen magnum*: and on this may be marked out the position of the occipital spine.

19. The *circumference* is measured by a graduated tape carried round the head immediately above the frontal sinuses or superciliary eminences, where they exist, or in the direction indicated by the dotted line *c c*, fig. 1.

These are the measurements relating more especially to the cranium regarded as a whole, and its regions, upon which the comparisons above given of the different crania are founded ; but those relating to the face may also be briefly noticed. They are,

20. The *zygomatic* width, or that between the zygomatic arches (*z*, fig. 3).

21. The *orbital* width, measured between the external orbital processes.

22. The *ethmoidal*, or the width of the ethmoid bone between the orbits.

23. The *nasal* or *fronto-nasal* radius (*n*, fig. 1), corresponding pretty nearly to the cranial axis of Prof. v. Baer, though not to the true cranial axis, which can scarcely be measured unless the skull is bisected.

24. The *maxillary* radius (*m*, fig. 1),—the difference between the last two indicating the degree of ortho- or prognathism, perhaps more precisely than the so-termed facial angle.

Catalogue of the Heterocerous Lepidopterous Insects collected at Sarawak, in Borneo, by Mr. A. R. WALLACE, with Descriptions of New Species. By FRANCIS WALKER, Esq., F.L.S.

[Continued from page 145.]

Gen. PARASA, *Moore*.

*Næra*, *Herr. Sch.*; *Walk*.

200. PARASA HUMERALIS, n. s. *Mas*. Prasina, capite antico ochraceo, thorace maculis duabus lateralibus fuscis, abdomine alisque posticis pallide testaceis, alis anticis basi ferrugineis fascia marginali ochracea. *Male*. Bright leaf-green. Head ochraceous in front. Thorax with a brown spot on each side. Abdomen pale testaceous. Legs testaceous, partly ochraceous. Fore wings ferruginous at the base, with an ochraceous marginal band, which is widened towards the interior angle. Hind wings pale testaceous, with a ferruginous fringe. Length of the body 7 lines; of the wings 15 lines.

Closely allied to *P. media* and to *P. Chloris*.

Gen. NAROSA, *Walk*.

201. NAROSA VELUTINA, n. s. *Mas*. Ochracea, hirsuta, palpis extus nigris, antennis robustis nudis, alis anticis velutinis basi lineisque duabus flexis margineque pallidis, punctis marginalibus nigris. *Male*. Dull ochraceous. Body hirsute. Palpi curved, slender, ascending, not rising higher than the vertex, black on the outer side. Antennæ simple, very stout. Fore wings velvety, rounded at the tips, pale at the base, and with two bent, undulating, pale lines; costa and exterior border also pale, slightly convex, the latter rather oblique; marginal points black. Hind wings pale. Length of the body 4 lines; of the wings 10 lines.

Closely allied to *N. conspersa*.

Gen. NAPREPA, *Walk*.

202. NAPREPA ATTACOIDES, n. s. *Mas*. Rufescens, capite fusco, antennis late pectinatis, thorace fasciis duabus cinereis, alis anticis apice subrotundatis, lineis quatuor denticulatis indistinctis costaque ferrugineis, gutta discali cana elongata. *Male*. Reddish. Head dark brown, with a white band between the antennæ. Palpi porrect, very short. Antennæ short, broadly pectinated. Thorax with two cinereous bands. Wings ample, thinly clothed; fringe partly cinereous; under side tinged with purple. Fore wings slightly rounded at the tips, with four indistinct denticulated ferruginous lines; costa ferruginous; discal dot hoary, elongated. Hind wings thickly clothed along the interior border. Length of the body 5 lines; of the wings 12 lines.

203. NAPREPA ALBICOLLIS, n. s. *Mas*. Rufescenti-cana, capite pe-

diffusque rufescenti-ferrugineis, thorace antico albo, antennis late pectinatis, alis anticis lineis tribus lunulatis indistinctis rufescenti-ferrugineis nigro punctatis, alis posticis margine exteriori liturisque apud marginem interiorem rufescenti-ferrugineis.

*Male.* Reddish hoary. Head, palpi, and legs reddish ferruginous. Antennæ very short, broadly pectinated. Thorax white in front. Fore wings acute, with three indistinct reddish-ferruginous lines which are composed of lunules, and are attended with elongated black points on the veins; exterior border rather oblique. Hind wings reddish-ferruginous along the exterior border; interior border with reddish-ferruginous marks; interior angle prominent. Length of the body 4 lines; of the wings 10 lines.

204. *NAPREPA ALBICEPS*, n. s. *Mas.* Alba, antennis brevissimis late pectinatis, alis subopalinis lineis duabus denticulatis fuscis nigro punctatis, anticis striga obliqua basali plagisque duabus fuscis, posticis margine exteriori vix flexo fimbria flexa.

*Male.* White. Palpi extremely short. Antennæ very short, broadly pectinated. Wings slightly opaline. Fore wings slightly acute, with two double denticulated lines, which are composed of brown lunules, and are accompanied by elongated black points; a brown oblique basal streak and two brown patches, one basal, the other on the fore part of the exterior border. Hind wings with lines much like those of the fore wings, the interior one nearly obsolete; exterior border very slightly bent; fringe brown. Length of the body 4 lines; of the wings 10 lines.

#### Gen. *SUSICA*, *Walk.*

205. *SUSICA BASALIS*, n. s. *Mas.* Subtestaceo-cana, nitens, palpis porrectis articulo 3<sup>o</sup> conico; antennis basi late pectinatis, alis anticis argenteo-sabulosus, extus fuscis macula discali rufa nigro marginata, spatio marginali rufescenti-ochraceo, alis posticis cervinis basi canis.

*Male.* Hoary, shining, slightly testaceous-tinged. Palpi porrect, extending rather beyond the head; 3rd joint conical. Antennæ broadly pectinated to beyond one-third of the length. Fore wings acute, with silvery spangles, brown exteriorly, excepting the marginal space, which is reddish ochraceous; brown part oblique on the inner side, bordered on the outer side by an undulating black line, including a red, black-bordered discal spot. Hind wings fawn-colour, hoary towards the base. Length of the body  $3\frac{1}{2}$  lines; of the wings 8 lines.

206. *SUSICA CONGRUA*, n. s. *Mas.* Cervina, antennis dimidio basali late pectinatis, alis anticis squamosis purpurascente tinctis nigro subconspersis linea recta obliqua ferruginea, alis posticis flavescentibus margine inferiore cervino fimbriato.

*Male.* Fawn-colour. Palpi porrect, broad, obtuse; joints not distinguishable. Antennæ broadly pectinated to half the length. Wings broad. Fore wings squamous, hardly acute, purplish-tinged, slightly

black-speckled; an oblique, straight, ferruginous middle line; costa straight; exterior border convex. Hind wings pale yellow, and fringed with fawn-colour along the interior border. Length of the body 5 lines; of the wings 12 lines.

Gen. BETHURA, n. g.

*Mas.* *Corpus* crassum. *Proboscis* obsoleta. *Palpi* robusti, erecti, pilosi, caput longe superantes, apice fasciculati. *Antennæ* basi late pectinatæ, apices versus serratæ. *Abdomen* lineare, subcarinatum, alas posticas superans. *Pedes* robusti, densissime fasciculati. *Alæ* anticæ sat angustæ, apice rotundatæ, margine exteriori perobliquo; posticæ brevès.

*Male.* Body very stout. *Proboscis* obsolete. *Palpi* stout, vertical, pilose, rising high above the head, densely tufted at the tips. *Antennæ* broadly pectinated towards the base, serrated towards the tips. *Abdomen* linear, slightly keeled above, extending beyond the hind wings. *Legs* stout, most densely tufted to the tips of the tarsi. *Fore wings* rather narrow, somewhat rounded at the tips; costa straight; exterior border extremely oblique; veins very distinctly marked; 2nd inferior vein nearly twice as far from the 3rd as from the 1st. *Hind wings* very much shorter than the fore wings.

Allied to *Scopelodes*.

207. BETHURA MINAX, n. s. *Mas.* Rufescens, abdomine ochraceo fasciis abbreviatis fasciculoque apicali nigris, alis anticis cano subconspersis, posticis pallide luteis.

*Male.* Reddish. *Abdomen* ochraceous, with abbreviated black bands; 1st and 2nd bands interrupted; apical tuft black. *Wings* with the fringe hoary, shining. *Fore wings* minutely hoary-speckled. *Hind wings* pale luteous. Length of the body 8 lines; of the wings 18 lines.

Gen. ALTHA, n. g.

*Mas.* *Corpus* crassum. *Proboscis* obsoleta. *Palpi* minimi. *Antennæ* triente basali late pectinatæ. *Abdomen* alas posticas superans. *Pedes* robusti, dense fasciculati. *Alæ* subvestitæ; anticæ apice rotundatæ, costa recta, margine exteriori convexo sat obliquo.

*Male.* Body thick. *Proboscis* obsolete. *Palpi* very minute. *Antennæ* broadly pectinated to a little beyond one-third of the length, simple from thence to the tips. *Abdomen* extending beyond the hind wings. *Legs* stout, thickly tufted. *Wings* moderately broad, thinly clothed. *Fore wings* somewhat rounded at the tips; costa straight; exterior border convex, rather oblique; 3rd inferior vein rather remote from the 2nd, which is very near the 1st.

208. ALTHA NIVEA, n. s. *Mas.* Nivea, alis anticis puncto discali punctoque marginali nigris.

*Male.* Pure white. *Fore wings* with an elongated black point at the

base of the 1st inferior vein, and with another on the exterior border. Length of the body 7 lines; of the wings 14 lines.

Gen. DARNA, n. g.

*Mas.* *Corpus* robustum. *Proboscis* obsoleta. *Palpi* porrecti, sat validi, caput paullo superantes; articulus 3<sup>us</sup> parvus, conicus. *Antennæ* breviusculæ, pectinatæ. *Abdomen* alas posticas non superans, fasciculo apicali sat magno. *Pedes* robusti, pilosi. *Alæ* latiusculæ, breviusculæ.

*Male.* Body stout. *Proboscis* obsolete. *Palpi* porrect, moderately stout, extending a little beyond the head; 3rd joint minute, conical. *Antennæ* rather short, moderately pectinated. *Abdomen* not extending beyond the hind wings; apical tuft rather large. *Legs* stout, pilose. *Wings* rather broad and short. *Fore wings* acute; costa straight; exterior border hardly oblique; the four inferior veins approximate.

209. DARNA PLANA, n. s. *Mas.* Nivea, alis anticis pallidissime cervinis, dimidio postico niveo, linea exteriori e atomis nigris, alis posticis subtestaceo tinctis margine exteriori pallidissime cervino.

*Male.* Pure white. *Fore wings* very pale fawn-colour, except for half the breadth along three-fourths of the length; an exterior line composed of black speckles, parallel to the exterior border, and hardly apparent except on the costa and by the interior border. *Hind wings* with a very slight testaceous tinge; exterior border very pale fawn-colour. Length of the body  $3\frac{1}{2}$  lines; of the wings 9 lines.

Gen. ARRHAPA, n. g.

*Mas.* *Corpus* robustum. *Proboscis* obsoleta. *Palpi* porrecti, sat graciles, caput vix superantes; articulus 3<sup>us</sup> conicus, minimus. *Antennæ* subpectinatæ. *Abdomen* alas posticas vix superans. *Pedes* breviusculi, læves, sat graciles; tibiæ posticæ calcaribus duobus apicalibus, uno longissimo. *Alæ* latæ, non longæ; anticæ acutæ, costa subconvexa, margine exteriori recto.

*Male.* Body robust. *Proboscis* obsolete. *Palpi* porrect, not thick, hardly extending beyond the head; 3rd joint conical, very minute. *Antennæ* slightly pectinated, moderately long. *Abdomen* hardly extending beyond the hind wings. *Legs* rather short, not stout nor pilose; hind tibiæ with two apical spurs, one of which is very long. *Wings* broad, not long. *Fore wings* acute, slightly and transversely rugulose; costa slightly convex; exterior border straight, very slightly oblique; 3rd inferior vein very near the 2nd.

210. ARRHAPA FRONTALIS, n. s. *Mas.* Lateritia, capite thoraceque antico ferrugineo-fuscis, abdomine alisque posticis albidis, alis anticis

lineis quinque undulatis transversis spatioque exteriore costali purpurascenti-fuscis, fimbria purpurascente.

*Male.* Brick red. Head and fore part of the thorax dark ferruginous brown. Abdomen and hind wings whitish. Fore wings with five undulating transverse purplish-brown lines; space along the exterior half of the costa and on one-third of the breadth purplish brown; fringe purplish. Length of the body 6 lines; of the wings 14 lines.

#### Gen. BIRTHAMA, n. g.

*Mas.* *Corpus* robustum. *Proboscis* obsoleta. *Palpi* porrecti, subcylindrici, non pilosi, caput sat superantes, articulo 3<sup>o</sup> conico parvo. *Antennæ* simplices. *Abdomen* alas posticas non superans, fasciculo apicali minimo. *Pedes* breves, robusti, pilosi; tibiæ posticæ calcaribus quatuor longis. *Alæ* spissæ, latiusculæ, non longæ; anticæ apice rotundatæ.

*Male.* Body robust. *Proboscis* obsolete. *Palpi* porrect, nearly cylindrical, not pilose, extending rather far beyond the head; 3rd joint conical, minute, not more than one-fourth of the length of the 2nd. *Antennæ* simple, moderately long and stout. *Abdomen* not extending beyond the hind wings; apical tuft very small. *Legs* short, stout, pilose; hind tibiæ with four long spurs. *Wings* dense, rather broad, not long. Fore wings rounded at the tips; costa straight; exterior border convex, rather oblique; interior angle very much rounded; 3rd inferior vein rather remote from the 2nd.

211. BIRTHAMA OBLIQUA, n. s. *Mas.* Rosea, abdomine pedibusque ochraceo-rufis, alis anticis linea diffusa obliqua nigricante, alis posticis roseo-cinereis margine exteriore roseo.

*Male.* Rosy red. *Abdomen* and legs more ochraceous. Fore wings with a diffuse oblique blackish line, which extends from one-third of the length of the interior border to the tips; under side without markings. Hind wings cinereous, with a rosy tinge and with a rosy-red exterior border. Length of the body 6 lines; of the wings 16 lines.

#### Fam. DREPANULIDÆ, Boisd.

##### Gen. DREPANA, Sch.

212. DREPANA QUADRIPUNCTATA, n. s. *Mas.* Testacea, antennis rufescentibus late pectinatis, alis linea exteriore subobscuriore lunulata denticulata, puncto discali nigro, alis anticis falcatis striga apicali nigra.

*Male.* Testaceous. *Antennæ* reddish, broadly pectinated. *Abdomen* whitish testaceous. *Wings* with the exterior line rather darker than the ground-hue, lunulate and denticulated, most distinct in the fore wings, where it terminates in a black apical streak; discal point black.

Fore wings falcate, with the middle and interior lines irregular, less distinct than the exterior line; the middle line obsolete, except towards the costa. Length of the body 3 lines; of the wings 10 lines.

213. *DREPANA MICACEA*, n. s. *Mas.* Ferrugineo-ochracea, antennis latissime pectinatis, alis chalybeo conspersis linea nigra recta diffusa duplicata, fimbria apice nigra, alis anticis falcatis litura discali nigra.

*Male.* Ferruginous ochraceous, paler beneath. Antennæ very broadly pectinated. Wings with chalybeous spangles, and with a black diffuse double line which extends from the tips of the fore wings to beyond the middle of the interior border of the hind wings, and is single on the under side; fringe black-tipped, chalybeous-spangled. Fore wings falcate, with a black discal mark; this is most distinct on the under side, where the black line is accompanied by another slighter and less exterior line. Length of the body 4 lines; of the wings 12 lines.

Fam. BOMBYCIDÆ, *Steph.*

Gen. *GASTROPACHA*, *Ochs.*

214. *Gastropacha vishnou*, *Lefebvre, Zool. Journ.* iii. 207. (*Amydona prasina*, *Walk. Cat. Lep.* 1st ser. 1417.)

Inhabits also Hindostan, Ceylon, and China.

Gen. *MEGASOMA*, *Boisd.*

215. *MEGASOMA BASIMACULA*, n. s. *Mas.* Cervina, lanuginosa, densissime vestita, capite thoraceque antico alisque anticis obscure ferrugineo-fuscis, antennis pallidis, abdominis fasciculo apicali chalybeo-nigro, alis anticis lineis quatuor indistinctis nigricantibus, macula basali ochracea, puncto discali albo lineaque submarginali e guttis nigris cinereo conspersis.

*Male.* Fawn-colour, woolly, very densely clothed, more brownish beneath. Head and fore part of the thorax dark ferruginous brown. Antennæ pale. Abdomen extending far beyond the hind wings; apical tuft chalybeous black. Fore wings dark-ferruginous brown, with a purplish tinge, and with four indistinct blackish lines; submarginal line composed of black cinereous-speckled dots, of which one on the interior border is much larger than any one of the others; a white point on the interior part of the disk, and an ochraceous spot very near the base. Hind wings very woolly. Length of the body 15 lines; of the wings 30 lines.

Gen. *GUNDA*, n. g.

*Mas.* *Corpus* crassum, lanuginosum, dense vestitum. *Proboscis* obsoleta. *Palpi* porrecti, gracillimi, caput non superantes. *Antennæ* breves, latissime pectinatae. *Pedes* robusti, densissime pilosi. *Alæ*



amplæ, spissæ; anticæ costa apicem versus obliqua, margine exteriore undulato; posticæ apice subtruncatæ, margine interiore dense fimbriato.

*Male.* Body very thick, woolly, densely clothed. Proboscis obsolete. Palpi porrect, short, very slender, not extending beyond the head. Antennæ short, very broadly pectinated. Legs stout, very densely pilose. Wings ample, dense. Fore wings with the costa deflexed towards the tips, which are rounded; exterior border undulating. Hind wings somewhat truncated at their tips; interior border densely fringed.

216. GUNDA OCHRACEA, n. s. *Mas.* Ochracea, alis anticis margine obscuriore, alis posticis subpallidioribus marginis interioris fimbria albida.

*Male.* Ochraceous. Fore wings somewhat darker along the interior border and towards the exterior border. Hind wings a little paler and brighter than the fore wings, with a whitish fringe along the interior border. Length of the body 10 (?) lines; of the wings 28 lines.

Fam. COSSIDÆ, *Newm.*

Gen. ZEUZERA, *Latr.*

217. ZEUZERA RORICYANEA, n. s. *Mas.* Alba, capite antico nigro, antennis ochraceis apice nigris, abdomine e guttis cyaneis quadri-lineato, alis anticis cyaneo guttatis et punctatis, alis posticis guttis duabus marginalibus cyaneis.

*Male.* White. Head black in front. Antennæ ochraceous, broadly pectinated, black and simple towards the tips. Abdomen extending far beyond the hind wings, with four rows of metallic-blue dots. Knees and tarsi with blue marks. Fore wings with numerous bright blue points and dots on the veins. Hind wings with two connected blue dots on the exterior border, near the interior angle. Length of the body 10 lines; of the wings 20 lines.

Gen. DEGIA, n. g.

*Mas et Fæm.* Corpus robustum. Proboscis obsoleta. Palpi minimi. Abdomen alas posticas superans. Pedes breves, sat graciles; tibiæ posticæ quadricalcaratæ. Alæ sat angustæ; anticæ apice rotundatæ, margine exteriore perobliquo. *Mas.* Antennæ late pectinatæ, apice serratæ. *Fæm.* Antennæ serratæ.

*Male and Female.* Body robust. Proboscis obsolete. Palpi very minute. Abdomen extending more or less beyond the hind wings. Legs short, rather slender; hind tibiæ with four moderately long spurs. Wings rather narrow. Fore wings rounded at the tips; costa straight; exterior border very oblique, interior angle much rounded. *Male.* Antennæ broadly pectinated, except towards the tips, where they are

serrated. *Female*. Antennæ serrated. Abdomen extending much beyond the hind wings.

218. *DEGIA IMPARATA*, n. s. *Mas et Fæm.* Sordide alba, antennis maris triente apicali serratis, alis anticis strigis transversis nigricantibus sæpe interruptis.

*Male and Female*. Dingy white. Antennæ of the male pectinated to much beyond half the length. Abdomen of the male clothed with long hairs. Fore wings with slight, transverse, partly interrupted, blackish streaks. Length of the body 8-9 lines; of the wings 16 lines.

219. *DEGIA DEFICIENS*, n. s. *Mas*. Sordide alba, antennis maris apice serratis, alis anticis strigis transversis fuscis plus minusve interruptis.

*Male*. Dingy white. Antennæ pectinated nearly to the tips. Abdomen clothed with long hairs. Fore wings with many slight, transverse, more or less interrupted, brown streaks. Length of the body 4-5 lines; of the wings 12-14 lines.

This species much resembles the preceding one, but may be distinguished by its smaller size and by the different structure of the antennæ.

#### Fam. CYMATOPHORIDÆ, *Herr.-Sch.*

##### Gen. THYATIRA, *Ochs.*

220. *Thyatira magniplaga*, *Walk. Cat. Lep.* 3rd ser. 1643.

#### Fam. BOMBYCOIDÆ, *Guen.*

##### Gen. DIPHTHERA, *Ochs.*

221. *DIPHTHERA JUCUNDA*, n. s. *Fæm.* Glauco-viridis, thorace fascia nigra albo marginata, abdomine punctis lateralibus nigris, alis anticis lineis quatuor integris lineaque costali flexa lituram discalem includente nigris denticulatis albo marginatis, alis posticis cinereis fusco latissime marginatis.

*Female*. Glaucous green. Palpi ascending, black above and at the tips; 3rd joint hardly one-third of the length of the 2nd. Thorax with a black white-bordered band. Abdomen with black points along each side. Fore wings with four denticulate black white-bordered lines; 3rd line double, including a white space; two other lines forming a loop from the costa, and enclosing the black transversely oblong white-pupilled discal mark; marginal line composed of elongated black white-bordered dots; fringe with blackish marks. Hind wings cinereous, with a very broad brown marginal band; exterior border and fringe as in the fore wings. Length of the body 7 lines; of the wings 16 lines.

##### Gen. ACRONYCTA, *Ochs.*

222. *ACRONYCTA RUBIGINOSA*, n. s. *Fæm.* Rubiginoso-cinerea, abdomine pallide cinereo, alis anticis lituris costalibus fuscis striga ob-

liqua vittaque dentata subinterrupta discalibus nigris, linea exteriore e lituris cuneatis, linea submarginali albida angulosa, punctis marginalibus nigris, alis posticis albis.

*Female.* Cinereous. Head, thorax, and fore wings tinged with rust-colour. Abdomen pale cinereous. Fore wings with brown marks along the costa, with a small oblique black discal streak, and with a black hindward stripe which is irregularly dentate and is almost interrupted in the middle; exterior line black, much bent, composed of cuneiform marks; submarginal line whitish, deeply zigzag; marginal points blackish. Hind wings white, slightly cinereous along the exterior border. Length of the body 9 lines; of the wings 20 lines.

Fam. LEUCANIDÆ, *Guen.*

Gen. LEUCANIA, *Hübner.*

223. LEUCANIA HAMIFERA, n. s. *Mas et Fæm.* Pallide cinereo-cervina, alis punctis marginalibus nigris, alis anticis nigro subconspersis costa albida vitta discali alba strigam albam hamatam includente, alis posticis basi margineque interiore albis.

*Male and Female.* Pale cinereous fawn-colour. Abdomen whitish towards the base. Wings with black marginal points. Fore wings thinly and minutely black speckled, whitish along the costa, with a darker fawn-coloured discal stripe which includes a white lanceolate hooked streak, the latter continued by a whitish slender line to the exterior border; 3rd inferior vein black-speckled. Hind wings white towards the base and along the interior border. Length of the body 8 lines; of the wings 16-18 lines.

224. LEUCANIA ROSEILINEA, n. s. *Mas.* Pallide testacea, alis anticis roseo strigatis, linea discali alba, puncto posteriore nigro, litura discali fusca diffusa, linea exteriore punctulari punctisque marginalibus nigris, alis posticis albis punctis marginalibus fusciscentibus.

*Male.* Pale testaceous. Abdomen whitish towards the base. Fore wings with dull rosy streaks between the veins; the latter with white lines, of which one in the disk is more conspicuous than the others, and has on its hinder side a black point formed by confluent speckles, and terminates in a diffuse brown mark at the base of the 1st and 2nd inferior veins; exterior line curved, composed of blackish points; marginal points black, minute. Hind wings white; marginal points brownish, indistinct. Length of the body 7 lines; of the wings 14 lines.

225. LEUCANIA SIMILLIMA, n. s. *Mas.* Pallide testacea, alis anticis fusciscente strigatis, linea discali alba, striga basali nigra, litura discali exteriore fusca, linea exteriore punctulari punctisque marginalibus nigris, alis posticis albis.

*Male.* Pale testaceous. Abdomen paler than the thorax. Fore wings

with indistinct brownish streaks between the veins, the latter with white lines as in the preceding species; discal line accompanied along its hinder side towards the base by a short, slight, black line, and contiguous in front at its tip to a diffuse brown mark; exterior line, marginal points, and hind wings as in the preceding species. Length of the body 7 lines; of the wings 15 lines.

This species very closely resembles *L. roseilinea*, and there may be connecting links between them; the chief difference is in the discal brown mark, which is not beyond but in front of the end of the white line.

226. *LEUCANIA*? *ABBREVIATA*, n. s. *Mas.* Pallide testacea, antennis subsetulosis subpubescentibus, abdomine longiusculo, alis breviusculis latiusculis, alis anticis acutis lineis interioribus ferrugineis vix conspicuis, linea submarginali valde interrupta e guttis nigricantibus.

*Male.* Pale testaceous. Palpi not rising so high as the vertex; 2nd joint curved; 3rd lanceolate, less than half the length of the 2nd. Antennæ minutely setulose and pubescent. Abdomen rather long, extending a little beyond the hind wings. Legs rather slender; spurs very long. Wings short, rather broad. Fore wings acute, with some indistinct ferruginous lines towards the base, and with a very incomplete submarginal line composed of blackish cinereous dots; costa straight; exterior border very slightly convex, rather oblique. Length of the body 5 lines; of the wings 10 lines.

#### Gen. *NONAGRIA*, *Ochs.*

227. *NONAGRIA SETICORNIS*, n. s. *Fæm.* Murina, corpore subtus albido, palpis ascendentibus articulo 3<sup>o</sup> parvo, antennis subpubescentibus subsetulosis, alis anticis latiusculis fusco conspersis apice rotundatis, lineis duabus fuscis denticulatis subundulatis, linea submarginali punctisque marginalibus nigricantibus, fimbria albida, alis posticis fuscis.

*Female.* Mouse-colour. Body whitish beneath. Palpi ascending, slightly curved, not rising higher than the vertex; 3rd joint conical, minute, less than one-fourth of the length of the 2nd. Antennæ minutely pubescent and setulose. Abdomen extending a little beyond the hind wings; hind borders of the segments and tip white. Wings rather broad, not long. Fore wings rounded at the tips, brown-speckled; interior and exterior lines brown, slender, denticulated, slightly undulating; submarginal line and marginal points blackish; fringe whitish; costa slightly convex; exterior border convex, rather oblique. Hind wings brown. Length of the body  $6\frac{1}{2}$  lines; of the wings 14 lines.

This species may form a new genus.

#### Gen. *BESSARA*, n. g.

*Mas.* Corpus crassum. Proboscis distincta. Palpi oblique ascenden-

tes, verticem non superantes, articulo 3<sup>o</sup> parvo conico. *Antennæ* subpubescentes. *Abdomen* alas posticas non superans. *Pedes* breviusculi, sat graciles, femoribus tibiisque late fimbriatis, calcaribus quatuor longis. *Alæ* latiusculæ, breviusculæ; anticæ apice rectangulatæ, margine exteriore non obliquo.

*Male.* Body very stout. Proboscis distinct. Palpi obliquely ascending, not rising so high as the vertex; 3rd joint conical, about one-fourth of the length of the 2nd. *Antennæ* minutely pubescent. *Abdomen* not extending beyond the hind wings. Legs rather short and slender; femora and tibiæ broadly fringed; hind tibiæ with four long spurs. Wings broad, rather short. Fore wings acutely rectangular, costa quite straight; exterior border hardly convex, not oblique.

228. *BESSARA QUADRATIPENNIS*, n. s. *Mas.* Cinereo-rufescens, pectore albo, alis roseo fimbriatis, alis anticis lineis duabus cinereis angulosis indistinctis, linea submarginali e lituris fuscis, punctis marginalibus nigricantibus, alis posticis cinereo-fuscis, marginis interioris fimbria longa albida.

*Male.* Cinereous reddish. Pectus white, shining. *Abdomen* cinereous. Wings with a rosy fringe. Fore wings with the interior and exterior lines cinereous, zigzag, very indistinct; submarginal line composed of brown marks; marginal points blackish, indistinct. Hind wings cinereous brown; interior border fringed with long whitish hairs. Length of the body 7 lines; of the wings 16 lines.

#### Gen. DIDIGUA, n. g.

*Fæm.* *Corpus* sat robustum. *Proboscis* distincta. *Palpi* ascendentes, articulo 2<sup>o</sup> subarcuato, 3<sup>o</sup> minimo. *Antennæ* subsetulosæ. *Abdomen* alas posticas paullo superans. *Pedes* læves, breviusculi, sat robusti; tibiæ posticæ calcaribus quatuor longissimis. *Alæ* latiusculæ, non longæ; anticæ apice rotundatæ, costa perparum convexa, margine exteriore subconvexo.

*Female.* Body moderately stout. Proboscis distinct. Palpi ascending, not rising so high as the vertex; 2nd joint slightly curved; 3rd joint conical, very minute, less than one-sixth of the length of the 2nd. *Antennæ* very minutely setulose. *Abdomen* extending a little beyond the hind wings. Legs smooth, rather short and stout; hind tibiæ with four very long spurs. Wings rather broad, not long. Fore wings rounded at the tips; costa very slightly convex; exterior border slightly convex, moderately oblique.

229. *DIDIGUA PURPUREOSCRIPTA*, n. s. *Fæm.* Fuscescenti-cinerea, corpore subtus albido, alis anticis lineis tribus purpurascentibus diffuis undulatis, linea 2<sup>a</sup> subduplicata, disco subtus nigricante, alis posticis cyaneo-fuscis.

*Female.* Brownish cinereous. Body whitish beneath. Fore wings

with the interior, exterior, and submarginal lines purplish, diffuse, undulating; exterior line indistinctly double on the exterior side, the supplementary line very diffuse; under side with a blackish disk. Hind wings brown, mostly tinged with metallic blue. Length of the body 7 lines; of the wings 14 lines.

Fam. GLOTTULIDÆ, *Guen.*

Gen. BELCIANA, n. g.

*Mas.* *Corpus* robustum. *Proboscis* distincta. *Palpi* longiusculi, oblique ascendentes; articulus 2<sup>us</sup> crassus; 3<sup>us</sup> linearis, gracilis, 2<sup>o</sup> dimidio longior. *Antennæ* nudæ. *Abdomen* alas posticas paullo superans. *Pedes* validi, dense fimbriati; tibiæ posticæ calcaribus quatuor longissimis. *Alæ* amplæ; anticæ acutæ, costa recta, margine exteriori convexo.

*Male.* Body stout. *Proboscis* distinct. *Palpi* obliquely ascending, rather long; 2nd joint thick; 3rd linear, slender, much shorter than the 2nd. *Antennæ* simple. *Abdomen* extending a little beyond the hind wings. *Legs* stout; femora and tibiæ densely fringed; hind tibiæ with four very long spurs. *Wings* ample. *Fore wings* acute; costa straight; exterior border convex, moderately oblique.

230. *Belciana biformis*, *Walk. Cat. Lep.* 3rd ser. 1671 (*Dandaca*).

Gen. ZIGERA, n. g.

*Mas.* *Corpus* robustum. *Proboscis* brevissima. *Palpi* compressi, vix arcuati, verticem paullo superantes; articulus 3<sup>us</sup> lanceolatus, 2<sup>i</sup> dimidio fere longior. *Antennæ* subpubescentes. *Abdomen* alas posticas non superans, fasciculo apicali parvo. *Pedes* breviusculi; genua intermedia penicillata; tibiæ posticæ calcaribus quatuor longis. *Alæ* latæ, non longæ; anticæ vix acutæ, costa recta, margine exteriori subconvexo.

*Male.* Body robust. *Proboscis* very short. *Palpi* ascending, compressed, very slightly curved, rising rather higher than the vertex; 3rd joint lanceolate, full half the length of the 2nd. *Antennæ* very minutely pubescent. *Abdomen* not extending beyond the hind wings; apical tuft small. *Legs* rather short, moderately stout; middle knees with a fan-shaped tuft of hairs; hind tibiæ with four long spurs. *Wings* broad, not long. *Fore wings* hardly acute; costa straight; exterior border slightly convex, very slightly oblique.

This genus has some likeness to *Aquis*, but hardly associates with any of the established families of *Noctuïtes*.

231. *ZIGERA ORBIFERA*, n. s. *Mas.* *Ochracea*, alis punctis marginalibus nigris elongatis duplicatis, alis anticis nigricante substrigatis lineis duabus arcuatis albis, spatio intermedio fusco albo-consperso lituram

atram includente, linea submarginali nigricante diffusa indeterminata, alis posticis fasciis nonnullis undulatis nigricantibus fasciaque media albida.

*Male.* Ochraceous; under side and legs paler. Tuft on the middle knees ochraceous. Wings with black double elongated marginal points. Fore wings diffusedly and indistinctly blackish-streaked, with two transverse curved white lines which are nearest to each other on the costa and on the interior border; space between the lines containing nearly half the surface of the wing, brown, white-speckled, including a transverse deep-black discal mark; submarginal line blackish, diffuse, very incomplete. Hind wings with some diffuse undulating black or blackish bands, and with a more diffuse whitish middle band. Length of the body 6 lines; of the wings 12 lines.

Gen. BEANA, n. g.

*Mas.* *Corpus* robustum. *Proboscis* distincta. *Palpi* verticem non superantes; articulus 2<sup>us</sup> subarcuatus; 3<sup>us</sup> linearis, apice rotundatus, 2<sup>i</sup> dimidio non longior. *Antennæ* subsetulosæ. *Abdomen* alas posticas vix superans; fasciculus apicalis parvus. *Pedes* robusti; femora fimbriata; femora antica penicillata; tibiæ posticæ calcaribus quatuor longis. *Alæ* anticæ apice rectangulatæ, costa recta, margine exteriore subconvexo subdentato.

*Male.* Body stout. *Proboscis* distinct. *Palpi* ascending, not rising higher than the vertex; 2nd joint slightly curved; 3rd linear, rounded at the tip, about half the length of the 2nd. *Antennæ* minutely setulose. *Abdomen* hardly extending beyond the hind wings; apical tuft small. Legs stout; femora fringed; fore femora with a penicillate tuft of long hairs; hind tibiæ with four long spurs. Wings moderately broad. Fore wings rectangular at the tips; costa straight; exterior border minutely dentate, slightly convex and oblique.

232. BEANA POLYCHROMA, n. s. *Mas.* Cinerea, alis anticis æneis viridescentibus nigro conspersis, lineis interiore et submarginali nigris, 1<sup>a</sup> undulata; 2<sup>a</sup> interrupta et dilatata, fascia latissima spatiumque costali apicali albidis, alis posticis pallide cinereis, fascia margineque exteriore obscurioribus.

*Male.* Cinereous. Fore wings æneous, with various iridescent tints; speckles and markings black; markings chiefly consisting of the interior and submarginal lines, of which the first is undulating, and the 2nd is here and there interrupted and dilated; a very broad whitish band, much straitened in front; an oblong whitish space along the apical part of the costa, containing a brown spot and part of the submarginal line. Hind wings pale cinereous; a band and the exterior border darker. Length of the body 8 lines; of the wings 18 lines.

Gen. URBONA, n. g.

*Mas.* *Corpus* robustum. *Proboscis* brevis. *Palpi* graciles, breves,

verticem paullo superantes; articulus 2<sup>us</sup> vix arcuatus; 3<sup>us</sup> lanceolatus, 2<sup>i</sup> dimidio longior. *Antennæ* subpubescentes. *Abdomen* alas posticas paullo superans, apicem versus subcompressum; fasciculus apicalis deflexus. *Pedes* validi, læves; tibiæ posticæ calcaribus quatuor longissimis. *Alæ* anticæ apice subrotundatæ.

*Male.* Body stout. Proboscis short. Palpi slender, smooth, rising a little higher than the vertex; 2nd joint hardly curved; 3rd lanceolate, more than half the length of the 2nd. *Antennæ* very minutely pubescent. *Abdomen* extending a little beyond the hind wings, slightly compressed towards the tip; apical tuft diverging. Legs stout, smooth; hind tibiæ with four very long spurs. Wings moderately broad. Fore wings somewhat rounded at the tips; costa straight; exterior border convex, rather oblique.

233. *URBONA SUBLINEATA*, n. s. *Mas.* Alba, subtus obscure cinerea, alis anticis nigricante subconspersis, linea obliqua indistincta alba fusco submarginata, punctis marginalibus nigris, alis posticis obscure cinereis.

*Male.* Whitish, dark cinereous beneath. Fore wings minutely and irregularly blackish-speckled, with an indistinct white slightly brown-bordered line, which extends from the tips to the base of the interior border; marginal points black, minute. Hind wings dark cinereous. Length of the body 7 lines; of the wings 14 lines.

### Fam. APAMIDÆ, Guen.

#### Gen. SAVARA, n. g.

*Mas.* *Corpus* robustum. *Antennæ* subpectinatæ. *Abdomen* alas posticas superans. *Pedes* robusti, longiusculi; tibiæ posticæ quadricalcaratæ, calcari uno apicali longissimo. *Alæ* longiusculæ; anticæ acutæ, costa recta, margine exteriori subconvexo.

*Male.* Body robust. *Antennæ* slightly and equally pectinated. *Abdomen* extending somewhat beyond the hind wings. Legs stout, rather long; hind tibiæ with four spurs; one of the apical spurs very long. Wings rather long, moderately broad. Fore wings acute; costa straight; exterior border slightly convex, rather oblique; interior angle much rounded.

Allied to *Nephelodes*.

234. *SAVARA CONTRARIA*, n. s. *Mas.* Rufescenti-cervina, subtus cinerea, alis anticis lineis duabus obscurioribus undulatis valde indistinctis, linea submarginali e guttis elongatis nigricantibus reniformi pallida punctis duobus adhuc pallidioribus, alis posticis fuscis.

*Male.* Reddish fawn-colour. *Abdomen* and underside mostly cinereous. Fore wings with two darker, undulating, very indistinct transverse lines, and with a submarginal line of elongated blackish dots; reniform mark a little paler than the ground-hue, indicated also by two



still paler points. Hind wings brown. Length of the body 7 lines; of the wings 16 lines.

Gen. DIPTERYGIA, *Steph.*

235. DIPTERYGIA VAGIVITTA, n. s. *Mas.* Fusca, cinereo subconspersa, alis anticis lunulis transversis lineisque exterioribus abbreviatis nigris indistinctis, costa apicali albo punctata, vitta postica alba informi nigro marginata, fimbria albido notata, alis posticis pallidioribus, fimbria albida fusco interlineata.

*Male.* Brown, slightly cinereous-speckled. Abdomen cinereous. Fore wings with transverse lunules and with short exterior lines black, indistinct; some white points along the apical part of the costa, and some whitish marks on the fringe; an irregular white partly black-bordered stripe along the interior border. Hind wings paler brown; fringe whitish, interlined with brown. Length of the body 7-8 lines; of the wings 16-18 lines.

This species has a remarkable resemblance to the European *D. Pinastris*, but does not agree with it in several characters, of which the most conspicuous is the different outline of the pale part about the interior angle of the fore wings.

Gen. PRODENIA, *Guén.*

236. Prodenia infecta, *Walk. Cat. Lep.* 3rd ser. i. 96.

Inhabits also Hindostan.

237. PRODENIA RECLUSA, n. s. *Fæm.* Pallide cinereo-testacea, alis anticis atomis lineolisque nonnullis transversis arcuatis nigricantibus, gutta discali nigra, alis posticis albidis.

*Female.* Pale cinereous testaceous. Abdomen pale cinereous. Fore wings diffusely and indistinctly blackish-speckled, some of the speckles forming very indistinct transverse curved lines, of which one is exterior and more conspicuous than the others; discal dot black. Hind wings whitish. Length of the body 5 lines; of the wings 12 lines.

Gen. MAMESTRA, *Ochs.*

238. MAMESTRA PRODITA, n. s. *Mas.* Nigricanti-cinerea, palpis vix arcuatis articulo 3<sup>o</sup> minimo, abdomine cristis nigricantibus, alis anticis lineis variis nigris angulosis indistinctis, orbiculari et reniformi albidis, hac annulum nigrum includente, alis posticis albido-cinereis fusco late marginatis.

*Male.* Blackish cinereous. Palpi ascending, very slightly curved; 3rd joint conical, not one-sixth of the length of the 2nd. Abdomen cinereous, with blackish crests. Fore wings with various transverse zigzag indistinct black lines; orbicular and reniform marks whitish, nearly round, the latter including a black ringlet. Hind wings whitish

cinereous, with a broad brown border. Length of the body 5 lines; of the wings 12 lines.

This species very closely resembles *M. Brassicæ*.

239. *MAMESTRA ALBISPARS*, n. s. *Mas.* Nigricanti-cinerea, palporum articulo 3<sup>o</sup> longiconico, antennis subpubescentibus, abdomine alas posticas superante, pedibus densissime pilosis, alis anticis lineis nigris undulatis indistinctis, reniformi alba nigro pupillata et marginata, striga exterior obliqua alba, linea submarginali alba denticulata, punctis marginalibus nigris.

*Male.* Blackish cinereous. Third joint of the palpi elongate-conical, less than one-fourth of the length of the 2nd. Antennæ very minutely pubescent. Abdomen cinereous, extending beyond the hind wings. Legs very densely clothed. Fore wings with indistinct transverse black undulating lines; reniform mark white, obliquely oblong, black-pupilled and bordered, contiguous to an oblique white streak, which is about twice its length; submarginal line white, denticulated; marginal points black. Hind wings cinereous; marginal line brown. Length of the body 8 lines; of the wings 18 lines.

#### Fam. NOCTUIDÆ, Guén.

##### Gen. AGROTIS, Ochs.

240. *AGROTIS INCONCLUSA*, n. s. *Mas.* Rufescenti-cinerea, palporum articulo 2<sup>o</sup> lato subarcuato, 3<sup>o</sup> minimo, antennis subpectinatis apice nudis, abdomine fasciculo apicali spisso, tarsis basi tibiisque late fimbriatis, alis anticis nigro conspersis rufescente subnotatis, lineis duabus fuscis, 1<sup>a</sup> angulata subdenticulata, 2<sup>a</sup> obliqua denticulata, fascia exterior fusciscente lineam e lunulis albidis includente, puncto discali punctisque duobus basalibus nigris.

*Male.* Reddish cinereous. Palpi ascending; 2nd joint broad, slightly curved; 3rd conical, extremely minute. Antennæ slightly pectinated, bare towards the tips. Abdomen with a large dense apical tuft. Tarsi towards the base, and tibiæ, broadly fringed. Wings with black marginal points. Fore wings indistinctly reddish-mottled, minutely black-speckled; interior and exterior lines brown, remote from each other; the 1st angular, slightly denticulated; the 2nd oblique, regularly denticulated, having along its outer side a brownish band, including a whitish line, composed of lunules, and along its inner side a row of brown points; a black discal point and two black points very near the base, one of them on the costa. Length of the body 8 lines; of the wings 18 lines.

241. *AGROTIS INFIXA*, n. s. *Mas.* Cinerea, palporum articulo 2<sup>o</sup> vix arcuato, 3<sup>o</sup> longiconico, antennis serratis pubescentibus, thorace fascia fusciscente, abdomine fasciculo apicali parvo, pedibus subpilosis, alis anticis lineis tribus angulosis lituraque basali necnon orbiculari et reniformi fuscis, alis posticis albidis.

*Male.* Cinereous. Head, thorax, and fore wings slightly tinged with wood-colour. Palpi ascending; 2nd joint hardly stout, very slightly curved; 3rd elongate-conical, hardly one-fourth of the length of the 2nd. Antennæ stout, serrated; the teeth pubescent. Thorax with a brownish band. Abdomen with a small apical tuft. Legs slightly pilose, not fringed. Wings with black marginal points. Fore wings with a brown basal mark; interior, exterior, and submarginal lines brown, slight, zigzag, the latter accompanied by a cinereous line; orbicular and reniform marks brown, irregular. Hind wings whitish. Length of the body 7 lines; of the wings 16 lines.

Fam. ORTHOSIDÆ, Guén.

Gen. THALATHA, n. g.

*Mas.* *Corpus* robustum. *Proboscis* distincta. *Palpi* ascendentes, sat graciles, subarcuati, ad frontem applicati; articulus 3<sup>us</sup> lanceolatus, 2<sup>i</sup> dimidio brevior. *Antennæ* nudæ. *Abdomen* cristatum, alas posticas vix superans. *Pedes* breviusculi, sat validi; tibiæ subfimbriatæ. *Alæ* anticæ apice subrotundatæ, costa recta, margine exteriore convexo.

*Male.* Body stout. Proboscis moderately long. Palpi rather slender, ascending, slightly curved, applied to the front; 3rd joint lanceolate, less than half the length of the 2nd. Antennæ simple. Abdomen crested, hardly extending beyond the hind wings. Legs rather short and stout; tibiæ slightly fringed; hind tibiæ with four long spurs. Wings moderately broad. Fore wings somewhat rounded at the tips; costa straight; exterior border convex, slightly oblique.

242. *Thalatha sinens*, Walk. *Cat. Lep.* 3rd ser. 746 (*Orthosia*).

*Var.* Fore wings with an irregular angular olive-coloured band, whose hind part is very oblique.

Gen. BARBESOLA, n. g.

*Mas.* *Corpus* robustum. *Proboscis* distincta, *Palpi* porrecti, compressi, caput superantes; articulus 2<sup>us</sup> latus; 3<sup>us</sup> minimus. *Antennæ* longæ, graciles, vix pubescentes. *Abdomen* subcarinatum, alas posticas vix superans, fasciculo apicali parvo compresso. *Pedes* validi; tibiæ intermediæ penicillatæ. *Alæ* anticæ apice rotundatæ, costa recta, margine exteriore convexo.

*Male.* Body stout. Proboscis distinct. Palpi porrect, compressed, extending beyond the head; 2nd joint broad; 3rd extremely minute. Antennæ long, slender, very minutely pubescent. Abdomen slightly keeled, hardly extending beyond the hind wings; apical tuft small, compressed. Legs stout; tibiæ dilated; middle tibiæ furnished at the base with a fan-shaped tuft of hairs which equal the tibiæ in length; hind tibiæ with four spurs of moderate length. Wings moderately broad; fringe long. Fore wings somewhat rounded at the tips; costa straight; exterior border convex, moderately oblique.

243. *BARBESOLA DEFIXA*, n. s. *Mas.* Cervina, cinereo iridescente suffusa, alis anticis nigro conspersis, lineis duabus indeterminatis, reniformi e atomis nigris, gutta basali nigra, lunulis marginalibus fuscis alis posticis æneo tinctis.

*Male.* Fawn-colour. Head, thorax, and fore wings slightly iridescent or suffused with dove-colour. Fore wings with irregular black speckles, some of which indicate very incompletely the interior and exterior lines, and form the nearly round reniform mark; a black dot near the base; marginal lunules brown. Hind wings with an æneous tinge. Length of the body 5 lines; of the wings 12 lines.

Gen. *DABARITA*, *Walk.*

244. *Dabarita subtilis*, *Walk. Cat. Lep.*, 3rd ser. 478.

Inhabits also Hindostan.

Gen. *CHORA*, n. g.

*Fœm.* *Corpus* crassum. *Proboscis* brevis. *Palpi* ascendentes, verticem non superantes; articulus 2<sup>us</sup> subarcuatus; 3<sup>us</sup> minimus. *Antennæ* glabræ. *Abdomen* depressum, alas posticas paullo superans. *Pedes* breves, robusti; tarsi spinosi. *Alæ* latiusculæ; anticæ rectangulatæ, costa basi convexa, margine exteriore subflexo.

*Female.* Body very stout. *Proboscis* short. *Palpi* ascending, not rising higher than the vertex; 2nd joint slightly curved; 3rd extremely minute. *Antennæ* bare. *Abdomen* somewhat depressed, extending a little beyond the hind wings. *Legs* short, stout; tarsi spinose; hind tibiæ with four long spurs. *Wings* rather broad. Fore wings rectangular, but hardly acute at the tips; costa convex towards the base; exterior border slightly bent in the middle, oblique hindward.

Allied to *Dabarita*.

245. *CHORA REPANDENS*, n. s. *Fœm.* Obscure rufescenti-fusca, subtus rufescens, alis anticis cinereo-purpurascente suffusis, linea interiore subdenticulata vix obliqua, linea exteriore recta cinerea fusco marginata non obliqua, disco subtus nigricante, alis posticis æneo fuscis.

*Female.* Dark-reddish brown, cinereous beneath. *Abdomen* mouse-colour, reddish along each side and at the tip, brighter red towards the tip beneath. Fore wings mostly suffused with purplish cinereous; this hue is intersected by a nearly upright, slightly denticulated interior line; exterior line straight, upright, cinereous, bordered with brown on the outer side; under side blackish, red towards the exterior border and along the costa. Hind wings æneous brown, red beneath. Length of the body 8 lines; of the wings 18 lines.

246. *CHORA CURVIFERA*, n. s. *Fœm.* Ochraceo-rufa, corpore subtus albo, alis anticis puncto maculaque exteriore discalibus e atomis nigris,

linea exteriori nigra duplicata subarcuata non obliqua, alis posticis pallidioribus.

*Female.* Ochraceous red. Body white beneath. Fore wings with a discal point and a large exterior discal spot composed of confluent black speckles; a more exterior, upright, double, very slightly curved black line. Hind wings much paler, whitish towards the base and along the interior border. Length of the body 9 lines; of the wings 20 lines.

Gen. *CELÆNA*, *Steph.*

247. *CELÆNA*? *OBSTRUCTA*, n. s. *Mas.* Rufescenti-cinerea, palpis ascendentibus articulo 3° lanceolato, antennis subpubescentibus, alis anticis rufescentibus, lincis tribus fuscis angulosis indistinctis, macula basali concava vitrea, reniformi e annulis duobus connexis albidis, punctis marginalibus nigris, alis posticis linea subtus fusca exteriori denticulata.

*Male.* Reddish cinereous, slightly iridescent. Palpi ascending; 3rd joint lanceolate, less than half the length of the 2nd. Antennæ minutely pubescent. Abdomen and hind wings brownish cinereous; the former tapering, extending a little beyond the hind wings, with a long apical tuft. Legs rather slender; hind tibiæ with four very long spurs. Wings moderately broad. Fore wings mostly reddish; interior, exterior, and submarginal lines brownish, zigzag, indistinct; a concave, vitreous, but not hyaline spot in the disk near the base; reniform mark forming two whitish connected ringlets; costa with some whitish points near the tip; marginal points black. Hind wings beneath with a brown denticulated exterior line. Length of the body 6 lines; of the wings 12 lines.

Fam. *CARADRINIDÆ*, *Guén.*

Gen. *AMYNA*, *Guén.*

248. *AMYNA*? *SUBTRACTA*, n. s. Fusca, subtus cinerea, pedibus nigro conspersis, alis anticis lincis tribus obscure fuscis denticulatis vix conspicuis, reniformi ex annulo cinereo, punctis tribus posterioribus albis, alis posticis fimbria ex parte alba.

Brown, mostly cinereous beneath. Head wanting. Legs black-speckled; hind tibiæ with one spur of each pair very long. Fore wings with the interior, exterior, and submarginal lines dark brown, denticulated, very indistinct; reniform mark forming a cinereous subcostal ringlet, behind which there are three white points. Hind wings, with the fringe of the exterior border, white in front and towards the interior angle; under side with a blackish discal dot, and with blackish points accompanying a lunulate brown exterior line. Length of the body 6 lines; of the wings 16 lines.

Fam. HADENIDÆ, *Guén.*Gen. DIANTHÆCIA, *Boisd.*

249. *DIANTHÆCIA SCRIPTIPLENA*, n. s. *Fœm.* Obscure fusca, palpis porrectis, alis anticis lineis albidis et cœvinis undulatis aut denticulatis, gutta discali alba elongata, striga marginali obliqua testacea, lunulis marginalibus nigris, strigis subtus albidis submarginalibus.

*Female.* Dark brown. Palpi porrect; 3rd joint of the palpi elongate-conical, about one-third of the length of the 2nd. Abdomen, hind wings, and underside cinereous brown. Fore wings with whitish and fawn-coloured transverse lines; interior lines deeply undulating; exterior lines denticulated; a white elongated discal dot; an oblique testaceous marginal streak; marginal lunules black; under side with a brown denticulated exterior line (which is continued on the hind wings) and with whitish submarginal streaks. Length of the body 8 lines; of the wings 18 lines.

## Gen. OBANA, n. g.

*Fœm.* *Corpus* sat robustum. *Proboscis* brevis. *Palpi* porrecti, caput superantes; articulus 2<sup>us</sup> latiusculus; 3<sup>us</sup> lanceolatus, 2<sup>i</sup> dimidio brevior. *Antennæ* nudæ. *Abdomen* carinatum, alas posticas non superans. *Pedes* sat validi. *Alæ* margine exteriore antico subexcavato; anticæ subrotundatæ, costa recta, margine interiore fasciculo ciliari.

*Female.* Body moderately stout. *Proboscis* short. *Palpi* porrect, extending rather beyond the head; 2nd joint rather broad; 3rd lanceolate, less than half the length of the 2nd. *Antennæ* simple. *Abdomen* keeled, not extending beyond the hind wings. *Legs* moderately stout; hind tibiæ with one of the apical spurs very long. *Wings* moderately broad; exterior border slightly excavated in front. Fore wings somewhat rounded at the tips; costa straight; exterior border rather oblique hindward; interior border fringed opposite the exterior line.

Allied to *Dianthæcia*.

250. *OBANA PULCHRILINEA*, n. s. *Fœm.* Obscure ochracea, subtus cinerea, alis anticis nigro-fuscis, linea argentea duplicata serpentina, dimidio basali obscure ochraceo, striga marginali alba obliqua, linea submarginali argentea interrupta nigro marginata, alis posticis cupreo-fuscis.

*Female.* Head and thorax dark ochraceous. Abdomen and underside cinereous. Fore wings blackish brown, adorned with a double very meandering silvery line; nearly half the basal half obliquely dark ochraceous; an oblique white streak on the middle of the exterior border; submarginal line silvery, interrupted, bordered with black. Hind wings cupreous brown, with a cinereous shining fringe. Length of the body 4½ lines; of the wings 12 lines.

Gen. *HADENA*, *Treit.*

251. *HADENA DUPLICILINEA*, n. s. *Fæm.* Rufescenti-fusca, palpis erectis articulo 3<sup>o</sup> lineari longissimo, alis vix denticulatis, alis anticis lineis quatuor undulatis (duabus duplicatis) lituris costalibus lunulisque marginalibus nigris, spatio marginali albido consperso, alis posticis fuscis cinereo lineatis, lunulis marginalibus fuscis albido marginatis.

*Female.* Dark-reddish brown. Abdomen and underside paler. Pal unusually long, rising a little above the head; 3rd joint linear, nearly as long as the 2nd. Abdomen hardly extending beyond the hind wings. Hind tibiæ with very long spurs. Wings moderately broad; exterior border hardly dentated. Fore wings with black costal marks, with white points near the tip of the costa, with black marginal lunules, and with four irregular undulating black lines; interior and exterior lines double; space about the exterior border irregularly and interruptedly whitish-speckled. Hind wings brown, with some cinereous lines, of which the submarginal one is most distinct; marginal lunules brown, whitish-bordered. Length of the body 6 lines; of the wings 14 lines.

Gen. *ANCARA*, *Walk.*

252. *Ancara replicans*, *Walk. Cat. Lep.* 3rd ser. 1715.

253. *Ancara obliterans*, *Walk. Cat. Lep.* 3rd ser. 1715.

254. *ANCARA PUNCTIPLAGA*, n. s. *Fæm.* Obscure ferrugineo-fusca, antennis subpectinatis, alis anticis plaga postica discali lituris costalibus lineisque interruptis lunulisque marginalibus nigris, plaga subcostali exteriore magna cervina puncta dua nigra includente, alis posticis fusciscenti-cinereis.

*Female.* Dark ferruginous brown. Palpi rising a little higher than the vertex; 3rd joint linear, rounded at the tip, about half the length of the 2nd. Antennæ very minutely pectinated. Abdomen and hind wings brownish cinereous, the latter with a black discal spot on the under side. Fore wings with black marks along the costa, and with interrupted black lines which are composed of lunules; a black patch in the disk hindward near the base, and a larger exterior fawn-coloured patch near the costa, the latter containing two black points; marginal lunules black. Length of the body 9 lines; of the wings 20 lines.

Gen. *DATA*, n. g.

*Fæm.* *Corpus* robustum. *Proboscis* distincta. *Palpi* validi, oblique ascendentes, verticem non superantes; articulus 3<sup>us</sup> linearis, 2<sup>i</sup> dimidio non longior. *Antennæ* glabræ. *Abdomen* alas posticas superans. *Pedes* validi, densissime pilosi; tibiæ posticæ calcaribus quatuor lon-

gissimis. *Alæ* anticæ apice subrotundatæ, costa recta, margine exterioriore convexo.

*Female.* Body robust. Proboscis distinct. Palpi stout, obliquely ascending, not rising higher than the vertex; 3rd joint linear, rounded at the tip, about half the length of the 2nd. Antennæ smooth. Abdomen extending somewhat behind the hind wings. Legs stout; posterior femora and tibiæ most densely clothed; hind tibiæ with four very long spurs. Wings moderately broad. Fore wings slightly rounded at the tips; costa straight; exterior border convex, dentated.

Allied to *Ancara*.

255. *DATA THALPOPHILOIDES*, n. s. *Fœm.* Obscure rufescenti-fusca, abdomine pallide flavo apicem versus rufescenti-fusco, alis anticis fasciis nebulosis nigricantibus, lineis tribus albidis undulatis, spatio marginali glaucescente consperso, puncto discali albo, alis posticis pallide flavis margine latissimo ferrugineo.

*Female.* Deep reddish brown, paler beneath. Abdomen pale yellow, reddish brown towards the tip. Fore wings with blackish-mottled bands; basal, interior, and exterior lines whitish, more or less undulating; marginal space speckled with bluish white; discal point shining white; three white points near the tip of the costa; fringe with a pale line opposite each vein. Hind wings pale yellow, with a very broad ferruginous border. Length of the body 8 lines; of the wings 18 lines.

#### Gen. *BARASA*, n. g.

*Mas.* *Corpus* sat robustum. *Proboscis* conspicua. *Palpi* verticem superantes, vix arcuati; articulus 3<sup>us</sup> linearis, 2<sup>o</sup> vix brevior. *Antennæ* subsetulosæ, subpubescentes. *Abdomen* alas posticas paullo superans. *Pedes* sat validi; tibiæ posticæ calcaribus quatuor longissimis. *Alæ* anticæ apice rotundatæ, costa recta, margine exterioriore convexo, margine interioriore fasciculato.

*Male.* Body rather stout. Proboscis distinct. Palpi ascending, rather long, hardly curved, rising higher than the vertex; 3rd joint linear, rounded at the tip, nearly as long as the 2nd. Antennæ minutely setulose and pubescent. Abdomen extending a little beyond the hind wings. Legs rather stout; hind tibiæ with four very long spurs. Wings moderately broad. Fore wings rounded at the tips; costa straight; exterior border convex, moderately oblique; interior border with a tuft of very long hairs.

256. *BARASA ACRONYCTOIDES*, n. s. *Mas.* Alba, subtus cinerea, thorace fascia cinerea, alis anticis cinereo ex parte tinctis, lineis duabus nigris, 1<sup>a</sup> incompleta angulata, 2<sup>a</sup> undulata denticulata, linea submarginali nigricante angulosa, punctis marginalibus nigris, lituris duabus costalibus duabusque discalibus nigricantibus.

*Male.* White, cinereous beneath. Thorax squamous, with a cinereous



band. Abdomen slightly cinereous, tinged with æneous. Fore wings partly tinged with cinereous; this hue mostly towards the tips; interior and exterior lines black; the 1st very incomplete, forming an acute angle; the 2nd undulating and denticulated; submarginal line blackish, deeply zigzag; marginal points black; fringe with brown marks; costa with two blackish marks, one at the base, the other before the middle, each of them separated by a narrow interval from a blackish mark in the disk. Hind wings slightly iridescent. Length of the body 7 lines; of the wings 16 lines.

Gen. *CÆDESA*, n. g.

*Fœm.* *Corpus* robustum. *Proboscis* distincta. *Palpi* lati, compressi, oblique ascendentes; articulus 3<sup>us</sup> longiconicus, 2<sup>i</sup> dimidio non longior. *Antennæ* glabræ. *Abdomen* longiconicum, alas posticas perpaullo superans. *Pedes* breves, validi; tibiæ posteriores densissime pilosæ; tibiæ posticæ quadricarcatæ. *Alæ* anticæ vix acutæ, costa recta, margine exteriori convexo perobliquo.

*Female.* Body stout. *Proboscis* distinct. *Palpi* broad, compressed, obliquely ascending; 3rd joint elongate-conical, about half the length and breadth of the 2nd. *Antennæ* smooth. *Abdomen* elongate-conical, extending very little beyond the hind wings. Legs short, stout; posterior tibiæ very thickly pilose; hind tibiæ with four long stout spurs. Wings moderately broad. Fore wings hardly acute; costa straight; exterior border convex, very oblique.

Allied to *Polia*.

257. *CÆDESA AGROPOIDES*, n. s. *Fœm.* Olivaceo-viridis, palpis nigris, thorace abdomineque nigro conspersis, alis anticis lineis octo nigris undulatis dentatis, orbiculari magna annulari, reniformi nigro pupillata albo marginata, linea submarginali albo ex parte marginata strigas duas nigras emittente, alis posticis fuscis basi albis.

*Female.* Olive-green, cinereous beneath. *Palpi* mostly black. Thorax and abdomen black-speckled. Tibiæ black at the base and at the tips; tarsi black, with white bands. Wings with a black-marked fringe. Fore wings with eight undulating and dentate black lines; space between the 1st line and the 2nd, and between the 7th line and the 8th, broader than that between any two of the other lines; middle part with black speckles, some of which are confluent; orbicular mark forming a large ringlet; reniform mark of the usual shape, black-pupilled, white-bordered; submarginal line partly bordered with white, emitting two broad black streaks to the exterior border. Hind wings brown, white towards the base. Length of the body 5 lines; of the wings 12 lines.

Gen. *SERIA*, n. g.

*Mas.* *Corpus* sat robustum. *Proboscis* brevis. *Palpi* parvi, angulati.

*Antennæ* contortæ, dilatatæ, spatulatæ, apice serratæ. *Abdomen* alas posticas vix superans. *Pedes* validi; tibiæ posticæ pilis longissimis dense vestitæ. *Alæ* anticæ sat angustæ, apice subrotundatæ, costa recta, margine exteriore perobliquo.

*Male.* Body moderately stout. Head with a prominent acute frontal tuft. Proboscis short. Palpi small; 2nd joint obliquely ascending; 3rd porrect, less than half the length of the 2nd, with which it forms a slight angle. *Antennæ* somewhat spiral, dilated from the base to one-third of the length, beyond which they are more dilated and somewhat cup-shaped; apical part serrate. Abdomen hardly extending beyond the hind wings. Legs stout; hind tibiæ thickly clothed with very long hairs; spurs of moderate length. Wings rather narrow. Fore wings slightly rounded at the tips; costa straight; exterior border very oblique. This genus seems to connect the *Hadenidæ* with some of the genera of the *Herminidæ*.

258. *SERIA CYATHICORNIS*, n. s. *Mas.* Rufescens, antennis ex parte nigris, alis anticis lineis tribus indistinctis denticulatis nigricantibus, linea submarginali e guttis nigricantibus, reniformi ex annulis duobus connexis cinereis, alis posticis æneo-fuscis.

*Male.* Reddish, with a cinereous tinge beneath. *Antennæ* with the cup-shaped part black. Fore wings with three indistinct blackish denticulated lines; submarginal line formed of blackish dots; reniform mark composed of two cinereous connected ringlets with blackish disks, the fore one much smaller than the hind one. Hind wings æneous brown; fringe cinereous, shining. Length of the body 5 lines; of the wings 6 lines.

#### Gen. NEBRISSA, n. g.

*Mas.* *Corpus* crassum. *Proboscis* mediocris. *Palpi* erecti; articulus 3<sup>us</sup> conicus, parvus. *Antennæ* vix crenulatæ. *Abdomen* depressum, alas posticas superans, fasciculo apicali compresso. *Pedes* validi, pilosi. *Alæ* anticæ apice rotundatæ, costa recta, margine exteriore vix obliquo.

*Male.* Body thick. Proboscis moderately long. Palpi erect, rising as high as the vertex; 3rd joint conical, less than one-fourth of the length of the 2nd. *Antennæ* very minutely crenulate. Abdomen depressed, extending somewhat behind the hind wings; apical tuft compressed. Legs stout, pilose; hind tibiæ with one spur in each pair full twice the length of the other. Wings moderately broad. Fore wings rounded at the tips; costa straight; exterior border very slightly convex, hardly oblique.

This genus hardly belongs to the *Hadenidæ*.

259. *NEBRISSA BIMACULA*, n. s. *Mas.* Cinereo-albida, subiridescens, palpis extus fuscis, alis anticis nigro subconspersis, lineis tribus den-

ticulatis incompletis puncto discali lineaque submarginali nigris, macula submarginali nigricante, spatio marginali subrufescente.

*Male.* Cinereous whitish, slightly iridescent. Second joint of the palpi brown on the outer side. Fore wings thinly black-speckled; basal, interior, and exterior lines black, denticulated, slender, incomplete; a black discal point representing the orbicular mark; submarginal line composed of black points, contiguous to a large blackish spot; marginal space with a reddish tinge; marginal points black. Hind wings more whitish. Length of the body 6 lines; of the wings 12 lines.

Fam. XYLINIDÆ, *Guén.*

Gen. XYLINA, *Ochs.*

260. XYLINA CALIDA, n. s. *Fam.* Ferrugineo-rufa, palpis ascendentibus articulo 3<sup>o</sup> parvo, alis anticis lineis interruptis punctularibus punctisque marginalibus nigris, fimbria nigricante notata, vitta apud marginem interiorem nigra interrupta, alis posticis cupreo-fuscis.

*Female.* Ferruginous red, paler beneath. Palpi obliquely ascending; 3rd joint elongate-conical, full one-fourth of the length of the 2nd. Abdomen reddish cinereous, keeled. Fore wings with the black transverse lines much interrupted, mostly composed of elongated points; marginal points black; fringe with blackish marks; an irregular and interrupted black stripe along the interior border. Hind wings cupreous brown; fringe with a cinereous tinge; under side with a rather large dark-brown discal spot. Length of the body 7 lines; of the wings 16 lines.

261. XYLINA? LATIVITTA, n. s. *Fam.* Cinerea, sat gracilis, palporum articulo 3<sup>o</sup> longo, alis anticis sublignicoloribus apice rotundatis, vitta lata fusca albo marginata, costa vix convexa, alis posticis fusco pallido late marginatis.

*Female.* Cinereous, rather slender. Body and fore wings tinged with wood-colour. Third joint of the palpi nearly as long as the 2nd. Abdomen keeled. Wings broadly fringed. Fore wings somewhat rounded at the tips; costa hardly convex, with some blackish points; exterior border moderately oblique; a broad brown middle stripe extending along the whole length, bordered in front by a white line. Hind wings broadly and diffusely bordered with pale brown. Length of the body 4½ lines; of the wings 10 lines.

262. XYLINA PERVERSA, n. s. *Mas.* Albida, fusco conspersa, antennis pubescentibus, tibiis fimbriatis, alis anticis ex parte sublignicoloribus, strigis duabus parvis discalibus lunulisque marginalibus nigris, his albido marginatis, fimbria nigricante albo notata, alis posticis cinereo-fuscis.

*Male.* Whitish. Head, thorax, and fore wings speckled with brown. Palpi slightly ascending; 2nd joint broad, pilose; 3rd conical, not

more than one-fourth of the length of the 2nd. Antennæ distinctly pubescent. Abdomen extending a little beyond the hind wings. Tibiæ fringed; hind tibiæ with four long spurs. Fore wings tinged here and there with pale wood-colour; speckles in some parts confluent; two short black discal streaks; marginal lunules black, whitish-bordered; fringe blackish, with a white mark opposite each lunule. Hind wings cinereous brown. Length of the body 5 lines; of the wings 12 lines.

Gen. BATRACHARTA, n. g.

*Mas. Corpus robustum. Proboscis brevis. Palpi longi, subangulati; articulus 3<sup>us</sup> linearis, 2<sup>o</sup> brevior. Antennæ validæ, longæ, glabræ. Abdomen longum, subcristatum, alas posticas valde superans. Pedes validi; tibiæ fimbriatæ. Alæ elongatæ; anticæ apice rotundatæ, costa recta, margine exteriore perobliquo, margine interiore extus subexcavato.*

*Male.* Body robust. Proboscis short. Palpi long; 2nd joint obliquely ascending; 3rd more porrect, linear, shorter than the 2nd, with which it forms a slight angle. Antennæ stout, long, simple. Abdomen long, lanceolate, keeled, slightly crested, extending much beyond the hind wings. Legs stout; tibiæ fringed; hind tibiæ with four long spurs. Wings elongate. Fore wings much rounded at the tips; costa straight; exterior border slightly convex, extremely oblique, interior border slightly excavated exteriorly.

263. BATRACHARTA OBLIQUA, n. s. *Mas.* Lignicolor, thorace nigricante, alis anticis vitta nigricante lanceolata, spatio discali exteriore ferrugineo nebuloso, alis posticis pallide fuscis, macula discali subtus nigricante.

*Male.* Wood-colour. Thorax blackish, except in front. Fore wings with a blackish cinereous-varied stripe, which occupies the whole of the base, and tapers irregularly to four-fifths of the length of the costa, whence it is continued in an irregular dentate line along the tips and along the interior border; exterior discal space clouded with ferruginous. Hind wings pale brown; under side cinereous, with a large blackish discal spot. Length of the body 9½ lines; of the wings 20 lines.

Fam. HÆMEROSIDÆ, Guén.

Gen. ARIOLA, Walk.

264. *Ariola cœlisigna, Walk. Cat. Lep.* 3rd ser. 768.  
Inhabits also Ceylon.

265. *Ariola dilectissima, Walk. Cat. Lep.* 3rd ser. 1751.

266. ARIOLA CONTINUA, n. s. *Fœm.* Alba, palpis extus nigricantibus, abdomine longissimo subcervino, alis anticis dimidio antico nigro-viridi lineis nigris denticulatis, alis posticis æneo-fuscis.

*Female*. White. Palpi blackish on the outer side; 2nd joint slightly curved; 3rd lanceolate, a little shorter than the 2nd. Abdomen with a pale fawn-coloured tinge, extending for half its length beyond the hind wings. Fore wings blackish green in front, with denticulated black lines; the dark part widening from the base to the exterior border, where it nearly extends to the interior angle. Hind wings æneous brown. Length of the body 7 lines; of the wings 14 lines.

267. *ARIOLA INCLUDENS*, n. s. *Mas*. Alba, thorace fascia nigro-viridi, abdomine longissimo subtestaceo, alis anticis nigro-viridibus, vittis duabus albis ex parte connexis, 1<sup>a</sup> undulata, 2<sup>a</sup> informi marginali, alis posticis fuscis.

*Male*. White. Palpi like those of *A. continua*. Thorax with a blackish-green band. Abdomen slightly testaceous, very long, extending for more than half its length beyond the hind wings. Fore wings blackish green, with two partly connected white stripes; 1st stripe undulating, along the hinder part of the disk; 2nd stripe irregular, along the interior border. Hind wings brown. Length of the body 7 lines; of the wings 10 lines.

268. *ARIOLA DEFLEXA*, n. s. *Mas et Fam.*? Alba, thorace *fæminæ* postico nigro-viridi, alis anticis nigro-viridibus, spatio basali obliquo albo (*fæm.* nigro-viridi plagiato), lineis duabus indistinctis denticulatis nigris albo notatis, costa subconvexa, alis posticis cinereo-fuscis.

*Male*. White. Palpi blackish, cinereous in front. Thorax partly with an ochraceous tinge. Abdomen cinereous, extending a little beyond the hind wings. Fore wings blackish green; basal part obliquely white, partly tinged with ochraceous; a black discal point and some traces of two black denticulated white-marked lines, one exterior, the other submarginal; costa slightly convex. Hind wings cinereous brown. Length of the body 5 lines; of the wings 11 lines.

*Female*. Thorax blackish green, except in front. Basal white part of the fore wings with a blackish-green disk. Length of the body 4½ lines; of the wings 11 lines.

### Gen. DIGBA, n. g.

*Mas*. Corpus sat gracile. Proboscis conspicua. Palpi porrecti, caput vix superantes, articulo 3<sup>o</sup> minimo. Antennæ vix pubescentes. Abdomen alas posticas vix superans. Pedes validi, breves; tibiæ posticæ calcaribus quatuor longissimis. Alæ anticæ apice subrotundatæ.

*Male*. Body rather slender. Proboscis distinct. Palpi porrect, hardly extending beyond the head; 3rd joint extremely minute. Antennæ with scarcely perceptible pubescence. Abdomen hardly extending beyond the hind wings. Legs stout, smooth, not long; hind tibiæ with four long spurs. Wings moderately broad. Fore wings slightly rounded at the tips; costa and exterior border very slightly convex, the latter slightly oblique.

269. *DIGBA UNINOTATA*, n. s. *Mas.* Luteo-viridis, subtus alba, abdomine albo-viridi, alis anticis annulo discali purpurascente incompleto, alis posticis albis semihyalinis.

*Male.* Luteous green, white beneath. Abdomen whitish green. Fore wings with an incomplete purplish discal ringlet. Hind wings white, semihyaline, iridescent. Length of the body 3 lines; of the wings 8 lines.

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THE END.

PROCEEDINGS  
OF THE  
LINNEAN SOCIETY OF LONDON.

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November 1st, 1860.

Thomas Bell, Esq., President, in the Chair.

Mr. Joshua Clarke, F.L.S., exhibited specimens of a new British plant (*Lathyrus tuberosus*) found last autumn at Fyfield, near Ongar, Essex; and read a short notice of it. (See "Botanical Proceedings," vol. v.)

Read, "Introduction to the Florula of Aden;" by Thomas Anderson, Esq., F.L.S. (See "Botanical Proceedings," Supplement to vol. v.)

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November 15th, 1860.

Thomas Bell, Esq., President, in the Chair.

Read, first, "Catalogue of Dipterous Insects collected by A. R. Wallace, Esq., in Batchian, Kaisaa, and Makian, and at Tidon in Celebes; with descriptions of new Species," by Francis Walker, Esq., F.L.S. (See "Zoological Proceedings," vol. v.)

Read, secondly, "Catalogue of the Dipterous Insects collected by Mr. Wallace at Manado in Celebes, and in Tond, with descrip-

tions of new Species"; by the same. (See "Zoological Proceedings," vol. v.)

Read, thirdly, "Note on the Fructification and Affinities of *Hydnum gelatinosum*, Fr.," by Frederick Currey, Esq., M.A., F.R.S. & L.S. (See "Botanical Proceedings," vol. v.)

Read, fourthly, "Extracts of a Letter from Miss Drew to Mr. Robert Paterson, of Belfast, On the Habits of Singing Mice." Communicated by the President.

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December 6th, 1860.

Thomas Bell, Esq., President, in the Chair.

William S. Atkinson, Esq.; Frederic John Farre, Esq., M.D.; Maxwell T. Masters, Esq.; and Walter Moxon, Esq., M.B., were elected Fellows.

Sir Charles Bunbury, Bart., F.L.S., exhibited a specimen of *Cinclidium stygium*, a rare moss, new to the county of Suffolk. In a note, dated Nov. 19th, 1860, which accompanied the specimen, Sir Charles states that it was discovered, at the beginning of the month by Mr. Edmund Skeppar, of Bury St. Edmunds, on Tuddenham Heath, near Mildenhall, long since noted as the locality of several rare plants, and especially of *Liparis Læselii*.

Read, first, "Notes on *Sphærularia Bombi*;" by John Lubbock, Esq., F.R.S., F.L.S.

Read, secondly, "The Natural Order *Aurantiaceæ*, with a Synopsis of the Indian Species;" by Daniel Oliver, Esq., F.L.S., Prof. Bot. Univ. Coll., Lond. (See "Botanical Proceedings," 2nd Supplement to vol. v.)

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December 20th, 1860.

George Bentham, Esq., V.P., in the Chair.

Thomas Walker, Esq., B.A., was elected a Fellow.



Mr. Bentham, V.P.L.S., exhibited specimens of a species of *Cavanillesia*, probably *C. platanifolia*, Humb. and Bonpl., brought from the neighbourhood of New Carthagená by M. Anthoine, and stated by him to have been obtained from a young tree felled by him, which measured 140 feet in height, without branches, except the parasol-like crown. The specimens consisted of flowers, fruit, a piece of the soft, pith-like wood, and of the liber, which closely resembles the Cuba Bass, but is of a somewhat coarser fibre.

Read, first, a Letter from C. C. Babington, Esq., F.R.S., F.L.S., announcing the discovery by Mr. G. Wolsey of *Isoëtes Hystrix*, Durieu, on L'Ancrese Common, in the Island of Guernsey. (See "Botanical Proceedings," vol. v.)

Read, secondly, an Extract of a Letter from Mr. Henry Mouhot to S. Stevens, Esq., F.L.S., dated Bankok, Siam, 7th April, 1860, and giving a description of the "Cambodian Mode of Engrafting."

Read, thirdly, Extract of a Letter from Dr. W. F. Daniell, F.L.S., to Mr. Kippist, dated Tien Tsin, Oct. 10th, 1860, and giving some account of the cultivated fruits and *Cerealía* of Northern China.

Read, fourthly, "Further Observations on *Entozoa*, with Experiments," by T. S. Cobbold, Esq., M.D., F.L.S. (See "Transactions," vol. xxiii. part 2.)

Read, fifthly, "On *Sclerostoma Syngamus*, and the Disease which it occasions in Birds;" by the same. (See "Zoological Proceedings," vol. v.)

Read, sixthly, "Notice of the Discovery of a Second Species of *Gyrodactylus* (*G. anchoratus*, Nordm.), parasitical upon certain Fish;" by C. L. Bradley, Esq., F.L.S. (See "Zoological Proceedings," vol. v.)

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January 17th, 1861.

Thomas Bell, Esq., President, in the Chair.

Christopher Dresser, Esq., Ph. D.; Robert Charles Hurst, Esq.; and John Millar, Esq., were elected Fellows.

Read, first, "On Prolification in Flowers, and especially on that form termed Median Prolification;" by Maxwell T. Masters, Esq., F.L.S. (See "Transactions," vol. xxiii. part 2.)

Read, secondly, Extract from a Letter, addressed to Sir W. J. Hooker, by Dr. Frederick Welwitsch, dated S. Paul de Loanda, Aug. 16th, 1860; and giving some account of the Botany of Benguela, Mossamedes, &c., in Western Africa. (See "Botanical Proceedings," vol. v.)

Certain alterations in the Bye-laws, agreed to by the Council, were read by the President, and ordered to be hung up in the Meeting-room.

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February 7th, 1861.

Thomas Bell, Esq., President, in the Chair.

William Carruthers, Esq., was elected a Fellow.

Dr. J. D. Hooker, F.R.S., F.L.S., exhibited a specimen of a new species of *Araucaria* (*A. Rulei*, Ferd. Müll.) from a volcanic islet off New Caledonia.

Read, a paper "On the Occurrence of *Festuca ambigua*, Le Gall, in the Isle of Wight;" by Alexander G. More, Esq., F.L.S. (See "Botanical Proceedings," vol. v.)

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February 21st, 1861.

Thomas Bell, Esq., President, in the Chair.

Arthur William Crichton, Esq.; Henry Tattershall Knowles Kempton, Esq.; Capt. Augustus Frederick Lendy; David Moore, Esq.; and Christopher Knox Ord, Esq., M.D., were elected Fellows; and Mr. William Laughrin was elected an Associate.

Read, first, Extracts from Letters addressed to Sir William and Dr. Hooker by Mr. Gustav Mann, giving an account of his second Ascent of Clarence Peak, Fernando Po. (See "Botanical Proceedings," vol. vi.)

Read, secondly, "A Glance at the Botany of the North Shore, Sydney;" by William Woolls, Esq. Communicated by the Librarian.

Read, thirdly, "Catalogue of the Dipterous Insects collected by Mr. A. R. Wallace at Gilolo, Ternate, and Ceram;" by Francis Walker, Esq., F.L.S. (See "Zoological Proceedings," vol. vi.)

Read, fourthly, "Description of a (supposed) new Annelid;" by E. Hart Vinen, Esq., M.D., F.L.S. (See "Zoological Proceedings," vol. vi.)

The alterations in the Bye-laws, proposed by the Council on the 17th of January, having been hung up in the Common Meeting-room of the Society, and read by the President at the two last successive General Meetings of the Society, were put to the Ballot, and confirmed by the Fellows at large in the terms of the Charter. (Copies of the modified Bye-laws, embodying these alterations, have been forwarded, by post, to the Fellows residing within the United Kingdom.)

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March 7th, 1861.

Thomas Bell, Esq., President, in the Chair.

Benjamin Carrington, Esq., M.D., was elected a Fellow.

Mr. Busk, F.R.S., Sec. L.S., exhibited the skull of a child between four and five years of age, procured by Mr. Mann in the mountainous region of Fernando Po, and said to belong to a peculiar race of Negroes, inhabiting the higher parts of the island. The skull offered some peculiarities of conformation, which rendered it of considerable interest.

Read, first, "Notes on *Menispermaceæ*, *Tiliaceæ*, *Bixaceæ*, and *Samydaceæ*;" by George Bentham, Esq., V.P.L.S. (See "Botanical Proceedings," 2nd Suppl. to vol. v.)

Read, secondly, "On the Vegetation of Clarence Peak, Fernando Po; with Descriptions of Mr. G. Mann's Plants from the higher parts of that Mountain;" by J. D. Hooker, Esq., M.D., F.R.S., F.L.S. (See "Botanical Proceedings," vol. vi.)

March 21st, 1861.

Thomas Bell, Esq., President, in the Chair.

Mr. David Moore, F.L.S., exhibited a flowering specimen of *Megacarpæa polyandra*, from the Botanic Garden, Glasnevin, where it was originally raised from seeds collected in the Himalaya Mountains by the late Major Madden, and where it flowered for the first time in April, 1855.

Read, first, "On the Possibility of taking a Zoological Census;" by Alfred Newton, Esq., M.A., F.L.S. (See "Zoological Proceedings," vol. vi.)

Read, secondly, "On the true Nature of certain Structures appended to the Feet of Insects and *Arachnida*, subservient to Locomotion;" by Tuffen West, Esq., F.L.S. (See "Transactions," vol. xxiii. part 2.)

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April 4th, 1861.

Thomas Bell, Esq., President, in the Chair.

Major Cary Barnard was elected a Fellow.

Mr. Heward, F.L.S., exhibited specimens of *Cælebogyne ilicifolia* and *Gyrostemon attenuatus* from the Herbarium of the late Allan Cunningham; and made some observations upon them.

Read, first, "On the Identification of the Grasses of the Linnean Herbarium;" by Col. William Munro, H.M. 39th Regt., C.B., F.L.S., &c. (See "Botanical Proceedings," vol. vi.)

Read, secondly, "Note on an Unusual Mode of Germination in the Mango (*Mangifera indica*);" by Maxwell T. Masters, Esq., F.L.S. (See "Botanical Proceedings," vol. vi.)

Read, thirdly, "Descriptions of some new Species of Ant from the Holy Land;" by Frederick Smith, Esq., Assist. Zool. Dep.,

British Museum. Communicated by Daniel Hanbury, Esq. F.L.S.  
(See "Zoological Proceedings," vol. vi.)

Read, fourthly, "Catalogue of the Heterocerous *Lepidoptera* collected by Mr. Wallace at Sarawak, Borneo;" by Francis Walker, Esq., F.L.S. (See "Zoological Proceedings," vol. vi.)

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April 18th, 1861.

Thomas Bell, Esq., President, in the Chair.

Henry Duckworth, Esq., and David Walker, Esq., M.D., were elected Fellows.

Read, first, "On the Circulation of the Blood in *Pegea*, as bearing on the question of a Lining to the Vascular System of the *Tunicata*;" by J. D. Macdonald, Esq., R.N., F.R.S. Communicated by George Busk, Esq., F.R.S., Sec. L.S. (See "Transactions," vol. xxiii. part 2.)

Read, secondly, "On the Physiology of the Pallial Sinuses of the *Brachiopoda*;" by the same. (See "Transactions," vol. xxiii. part 2.)

Read, thirdly, Extracts from Letters addressed by Gideon Linccum, Esq., to Charles Darwin, Esq., M.A., F.R.S., F.L.S., "On the Habits of the 'Agricultural Ant' of Texas." (See "Zoological Proceedings," vol. vi.)

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May 2nd, 1861.

Thomas Bell, Esq., President, in the Chair.

Robert Hogg, Esq., LL.D.; John Martin, Esq.; and Andrew Murray, Esq., were elected Fellows; and M. Isidore Geoffroy St. Hilaire was elected a Foreign Member.

Read, first, a Letter from Dr. John Kirk to Sir William Hooker, from the Zambesi Expedition.

Read, secondly, a Letter from Dr. Thomson to Dr. Hooker, on some plants collected at Aden.

Read, thirdly, the following "Note on *Omphalocarpon procerum*, Pal. Beauv.;" by George Bentham Esq., V.P.L.S. (accompanied by specimens).

The specimens now exhibited were gathered by Mr. Mann on the Cameroon River, in West Tropical Africa, and from the similarity of the general aspect of the tree, its foliage, and the remarkable fruits growing sessile on the main trunk, I have no hesitation in referring them to the *Omphalocarpon procerum* of Pal. de Beauvois, who found the tree in nearly the same district of West Tropical Africa, and figured it in his "Flore d'Oware et de Benin," vol. i. p. 7, pl. 5 & 6. Our flowers are indeed very different in the details of their structure from those described by De Beauvois; but any one who has much studied the above-quoted work, will have detected many instances where the detailed analyses of the flowers are very incorrect, owing sometimes to the fragmentary state of the specimens, at others to their having been mismatched, or the parts totally wanting supplied from recollection, or even from the imagination of the artist. Our flowers, like his, are females only; but instead of being distinctly gamopetalous, an inch long, with numerous imbricate sepals, I find 5 orbicular, concave sepals, about 3 lines diameter, the 2 outer ones very thick; 5 petals not larger than the sepals, similar in shape, but thinner and slightly connate at the base, where they are also united with the base of the barren filaments; these are numerous and short, the inner ones united in 5 lacinate scales. The ovary is conical with a thin sessile disk-like terminal stigma very minutely toothed; the cells are numerous, annular, with a single laterally attached ovule in each. The fruits, although far from having attained their full size, are as figured by De Beauvois, except that they present in their centre a curious spherical cavity from which the cells radiate. Our seeds are too young to show their internal structure, and still flat; but they have the remarkable long hilum figured.

From these particulars it appears evident that the tree belongs to *Ternstræmiaceæ*, and not to *Sapotaceæ*. In the absence of the male flower, its precise position in the order cannot be fixed. The flowers are those of *Ternstræmiaceæ* proper; the fruit comes perhaps nearest to that of *Pyrenoria*; and the seed, if correctly

described, to those of *Schima* and some *Gordonias*. The uniovulate cells of the ovary are peculiar in the order, as also the very remarkable structure of the pericarp, consisting of a number of woody nutlike particles closely fitting into each other, but easily separable.

Read, fourthly, the following "Note on Rope made of Tree-mallow Fibre;" by John Hogg, Esq., M.A., F.R.S., F.L.S.

"About a year ago I read a short paper on the Tree-Mallow (*Lavatera arborea*, Linn.) to the Society (see 'Proceedings,' vol. v. p. 51), in which I made some remarks on this noble British plant; and I also showed some of the woody stem and bark of a specimen of two years' growth. I mentioned at the same time that its *inner bark* was extremely *fibrous*, though coarse, and that it was evidently well-adapted for being formed into strong *ropes*, matting, and the like purposes.

"I have now the pleasure to exhibit a piece of *rope*, which is made of the fibre from the bark of this plant. It is strong, but coarse in texture, and is well-suited to many ordinary uses.

"The rope-maker who prepared it, said he did not think that it was capable of forming the finer cordage, or of receiving a bright polish, like hemp-fibre; but he considered that, as it seemed to become *stronger* and tougher by immersion in *water*, it would very probably be of much use for water or ship purposes.

"I am, however, inclined to think that, since this specimen of rope was manufactured from the fibres of a plant only *one* year old, the fibrous bark might be finer and of a better quality if taken from a two-years' old, or more mature plant.

"The rope-maker further told me that, as the bark gave out a great deal of mucilage, he was of opinion that it might prove serviceable in the fabric of common paper."

Read, fifthly, "Note on an Egg within an Egg;" by the same.

Mr. Hogg exhibited an egg containing within it a second egg, and stated that "whilst eating a common hen's egg in January 1858, he found *within it* what seemed to be a *second*, perfectly formed, but much smaller egg; the external covering being white and, of course, soft. Its length or longer diameter was about  $\frac{9}{16}$  of an inch, and its breadth or shorter diameter about  $\frac{7}{16}$ . It appeared to have within it a *vitellus* or globular yolk."

Referring to other recorded instances of a similar kind, Mr. Hogg mentioned the following account of a communication made to the Academy of Sciences in Paris, January 7th, 1856, by M. Valenciennes. "Note sur les œufs à plusieurs jaunes contenus dans le même coque." "Les œufs renfermant deux jaunes sont très rares, et ceux à trois jaunes le sont encore plus. M. Valenciennes s'en est procuré un, et il le fait passer sous les yeux de l'Académie. Après quelques considérations sur les œufs de poules à deux ou trois jaunes, l'auteur dit qu'il a observé cette duplicité de jaunes dans les œufs de divers autres oiseaux et de plusieurs mollusques." (Rev. Zool., 2 sér. tom. viii. p. 32.), and concluded by observing that the instance noticed by himself and presented to the Society differed from all others he had found recorded, in the circumstance that the egg in his case contained not merely a *double yolk*, but apparently a second *perfect small egg*.

Read, sixthly, "On the Floral Structure of *Osyris peltata*;" by E. de Crespigny, Esq. Communicated by Daniel Hanbury, Esq., F.L.S.

Mr. Howard, F.L.S., exhibited Specimens of *Cinchona Pahudiana* from Java, and made some remarks upon them.

Mr. Howard also read a Letter, addressed to himself by C. R. Markham, Esq., on the Cultivation of the various species of *Cinchona* in Southern India.

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May 24th, 1861.

*Anniversary Meeting.*

Thomas Bell, Esq., President, in the Chair.

This day, the Anniversary of the birth of Linnæus, and the day appointed by the Charter for the election of Council and Officers, the President opened the business of the Meeting with the following Address:—

GENTLEMEN,

THE circumstances under which I meet you to-day cannot fail to excite in me feelings so different from those which have ever



before presented themselves in my long intercourse with the Society, that I have the greatest difficulty in bringing myself to the expression of any of those ordinary topics which have, on previous occasions, formed the subjects of my annual address.

When on this day 46 years—then a very young man—I was admitted into the Society by its estimable founder, how little could I anticipate that I should have to look back upon so long a period of intimate and happy intercourse with many of the most eminent and distinguished naturalists and other scientific men who have, during that time, adorned this country; that I should have formed so many close and pleasant friendships which have constituted one principal charm and solace of the intervening portion of my life; and, above all, that, after an eight years' tenure, I should now be resigning a Chair which had been previously occupied by men whom it is indeed an honour to have succeeded, and my own occupation of which has been rendered so uniformly happy by the kindness and consideration and forbearance of those who placed me there!

It is, indeed, with no ordinary emotion of gratitude that I look back upon this latter and most important period of my fellowship with the Linnean Society. Called, most unexpectedly to myself, to succeed my late revered friend on his retirement, I might well have shrunk from the responsibility of the office, the arduous nature of its duties, and especially from the disadvantageous comparison between my illustrious predecessor and myself. But having once felt assured that my deficiencies (and no one could, I assure you, be more painfully aware of them than myself) might be, in some measure, obviated by an earnest endeavour to master the difficulties of the position, and an assurance, derived from past experience, that I should receive the warm support of the officers and Council, and that every allowance would be made by the Fellows at large for my inevitable shortcomings, I would not allow my misgivings to prevail against the expressed desire of so many of the Fellows. If, as I am assured, I have fulfilled those duties in any degree to their satisfaction, I most thankfully attribute it to the wise counsels, the cordial co-operation and support, and the lenient judgment with which I have at all times been favoured. Still the retrospect of the last eight years cannot but leave a mixed impression on my mind. The recollection of many mistakes (I fear but imperfectly rectified), of opportunities of usefulness neglected and of duties only partially fulfilled, must and ought to cause some regret, especially when it is considered that

the time for improvement is passed, and that in my case is falsified the adage, "Never too late to mend."

The period during which I have been in office has been an eventful one ; perhaps I do not exaggerate when, in this respect, I compare it advantageously with any other similar period in the history of the Society ; and it will not, I think, be uninteresting or useless if, in my brief valedictory address, I recur to some of the more remarkable events which have distinguished it, with the view of examining how far we have progressed in the fulfilment of our mission, and what has been the result of our work, either within our own immediate circle, or in the more extended sphere of our influence, or of our external relations.

One of the earliest changes which occurred in our arrangements was the establishment of the Journal of Proceedings. Many of you will recollect that before this plan was adopted, papers were occasionally read at our meetings which, however valuable they may have been in themselves, neither required the quarto form for their illustration, nor appeared, in other respects, to be adapted for that mode of publication. In addition to this, the accumulation of important matter which called for more speedy publication than could be effected by the annual issue of the Transactions, demanded, so to speak, a supplementary channel for its appearance. It was proposed that these requirements should be fulfilled by the octavo form of publication to which I am alluding. The innovation was so considerable, and that too in a body so eminently conservative as ours, that its proposal excited much attention, and was discussed with the freedom, and, at the same time, with the deliberation, which so important a change demanded. The result of much and deep consideration was the adoption of that form, which has ever since been carried out with a degree of regularity, greater, perhaps, than could have been reasonably expected, when it is considered upon how many contingencies its periodical issue depends. The success of the experiment (for such it was at its commencement) has fulfilled the anticipations of its warmest advocates ; and the satisfaction with which it has been received, not only by the Society, but by naturalists who were not of our body, both in England and abroad, has, I doubt not, contributed greatly to raise the character of the Society, to extend its usefulness, and in no small degree to increase our numbers by the accession of many a good working naturalist.

The most striking event, however, of the period of which I am

now speaking, was the removal of the Society from its old home in Soho Square to our present commodious and most desirable location; and in connexion with this important movement, our close approximation to the Royal Society, and the increased intercourse which we have enjoyed with that body since our juxtaposition. I think I may venture to say that all our most sanguine expectations, as to the advantages and pleasures of that relation, have been amply fulfilled. We have now enjoyed four years of prosperous occupation here, and in addition to the pecuniary advantage of immunity from rent, the increased accommodation in regard to space, and the greater convenience and beauty of our rooms, the success which has resulted from these circumstances in the scientific prestige which the Society has acquired, the great addition to our numbers and the increased extent and higher character of our publications, has shown how important to our welfare was the change which we then effected. This advantage has not, however, been enjoyed without an occasional cloud of doubt as to the duration of our occupancy; and it will be in the recollection of some present that I felt myself called upon in the year 1859 to allude in a particular manner to the proposals which were made, and which there was every reason to expect would be carried out, to cover the site of Burlington House and the vacant ground behind it, with buildings destined for the mingled occupancy of Government Offices, of Scientific Societies, and of the Royal Academy, and other institutions connected with art. This scheme is, for the present at least, abandoned; and we shall probably be left in undisturbed possession of our present abode for many years to come. The Royal Academy, by the recent extensive improvements in the present galleries, appear to have given up any idea of removing, and we shall be spared the threatened absurdity of the appropriation of the whole area in front of Burlington House, including the site of the present matchless colonnade, as a stand for carriages, useful only during the brief period of the Academy's annual exhibition.

If, however, the memorial of the last eight years present us with a general result of almost unprecedented prosperity, that period has been no less conspicuous in our history for the number and the melancholy importance of our losses by death.

In a Society so numerous as ours we must, according to the invariable statistics of mortality, annually have to lament the loss of many of our number, notwithstanding the length of life and of membership by which our list is distinguished, I believe, beyond

that of any other institution of the kind. The average of the age of our deceased fellows during this period is nearly 70 years, and of the term of fellowship not far from 34 years; and amongst those of whom we have been deprived are some who stand prominently forward in both these respects, more than one having numbered between ninety and a hundred years of life, and upwards of sixty of membership. Still the mortality goes on, and, year after year, those who, like myself, have grown old in connexion with the Society, see one after another of our old companions in the field of scientific labour and enjoyment, falling off from our side and beckoning to us to follow. In the brief space of eight years what a company of our old friends and associates have been removed from us! It is a brilliant but a sad array: Jameson, Newport, Stokes, Wallich, De la Beche, Edward Forbes, Greenough, George Sowerby, Dillwyn, John Reeves, Swainson, Buckland, Pepys, Yarrell, Royle, Broderip, Robert Brown, Richard Taylor, Dawson Turner, Henfrey, Horsfield and Spence, Bracy Clark, Hamilton Smith, and now, within a fortnight, Fitton and Henslow. From our foreign list we miss the honoured names of Adrien de Jussieu, of Charles Bonaparte, of Lichtenstein and Müller, Nees von Esenbeck, Bonpland, Temminck, Humboldt, Agardh, and the veteran Duméril.

Turning from the mournful impression which this enumeration must leave upon our minds, let us dwell for one moment on the other side of the subject, and whilst we gratefully acknowledge the accession of many younger members who have already attained deserved eminence, or who are advancing in the same road to honourable fame and distinction, let us look around amongst the fast-increasing numbers of the students of natural science who have not yet joined our ranks, and enlist them under our banner, to fill the places of those whose honoured names I have recited, that not only in numbers but in scientific status the Linnean Society may still maintain its high character.

The changes which have recently taken place with reference to the promotion of the study of Natural Science in the University of Oxford are so important, that I must be allowed to occupy a few moments of your time in a passing allusion to them.

In the year 1855 I took occasion to refer to the transition state which these studies were then undergoing at that great school of learning. The sum of £30,000 was to be set apart for the building of a Museum. Collections of great importance were either

actually in the possession of the University and waiting for a resting-place, or they were pouring in from various quarters. The Natural History tripos was proposed. The appointment of a Professor of Zoology, until that time unknown in either University, was looming in the uncertain distance. What do we now see? The Museum built and partly occupied; the collections increased to an extent which could scarcely have been anticipated, chiefly through the munificence of one of our Fellows, the Rev. F. W. Hope; the natural history specimens in the Ashmolean Museum transferred to the new Museum; honours conferred as a reward, in part, of a proficiency in natural knowledge, and a Hope Professor of Zoology actually appointed in the person of our own esteemed and talented Fellow, Professor Westwood, and this provided for by an act of liberality, unexampled in late years, on the part of the same gentleman to whom I have before alluded. Professor Westwood is incessantly and energetically employed, in conjunction with his colleagues, in carrying out these objects. At present these absorbing duties necessarily occupy so much of his time that we have to regret the temporary suspension of those original researches which have so much enriched entomological science; but he is thus preparing not only the means of his own future contributions to scientific literature, but especially laying the foundation of a school of natural science in our oldest University, which, I fully anticipate, will at a future day be unsurpassed in this country.

Turning to Cambridge, alas! one sole event absorbs all our interest, and calls up all our sympathy. Within the last few days, and almost before the ink was dry with which I had recorded on these leaves the too sure anticipation of the approaching fatal result of our admirable friend's illness, came the announcement that the University had been deprived of its excellent Professor of Botany, and we have to mourn the loss of as kindly and genial a spirit, and as honest and true a man, as ever endeared himself to his friends, or ever lived without an enemy. Professor Henslow has been so well and so long known, and his merits are so universally appreciated, that I need not dwell upon them here. I will only say that our grief for his loss is enhanced by the hopelessness of soon supplying his place in our esteem and affection, or his equal in the earnestness, zeal and success with which he carried out his benevolent schemes of enlarging and purifying the enjoyment of his peasant parishioners, by opening to their minds the beauties of nature, and showing them, as a Chris-

tian clergyman ought to do, that that religion is an imperfect one which stops short of exhibiting the great Object of our worship as the beneficent Creator of all that is pure and beautiful around us. His own love and enjoyment of nature was intense, and his benevolence was such that he could not be satisfied without enabling others, and especially the poor and children, to enjoy the same pleasure with him. There was, too, a remarkable unity and consistency, and, if I may so speak, a keeping in his character which is very rare. "The elements were so mixed in him," that whilst there was no excessive preponderance of any one quality at the expense of others, so there seemed to be no deficiency in any of those qualities which deserve and ensure universal respect and love, and which are essential to the completeness of the manly and Christian character.

I need not detain you by any detail of our scientific proceedings during the past year, as they are already, or will shortly be in your hands. It is sufficient for me to appeal to our publications and to your experience of the character of our meetings, to show that neither in regard to the scientific value of the papers read, nor to the interest of our conversational discussions, has there been any falling off from the progress which we have for a long time been enabled to record; and I believe that the Society has never evinced a more sound and healthy vitality than at the present time.

With regard to our financial position, which is so important an element in our prosperity, it is peculiarly gratifying to me to state that we have never been in a more satisfactory condition. At the last Anniversary, I mentioned that the last item of our bonded debt had just been paid off, but that payment had occurred too late to be included in the yearly account. It is therefore only in the Auditors' Report of the present year, that we have been able to announce our absolute immunity from the incubus of debt; whilst the balance in our hands is so considerable, that the Council has determined upon adding to the funded capital by the purchase of £200 in the Consolidated Fund. This is the first instance in which any sum has been funded by us, irrespective of legacies or other adventitious aid; and when this fact is considered in conjunction with the paying off of the only remaining item of our bonded debt, to which I have alluded, I cannot but heartily congratulate you upon so auspicious a fact, because there appears every probability that, in future years, the whole of the sums received in composition for annual payments may be similarly in-

vested. I need not say that it has always been my most anxious wish that this important object should be as soon as possible attained.

The independence of the Society and its free action can only be secured by the possession of a fund on which to fall back in case of any temporary suspension of prosperity, or of any contingent call for unusual or unexpected expenditure.

Although I have not thought it necessary to enter into any detail of our own corporate acts, I think it will be interesting to you to learn that in the completion of Mr. Bentham's '*Flora of Hong-kong*,' we have, I believe, the first example of a colonial flora published under the auspices of the Colonial Secretary, with Government aid, and that the first volume of the '*Flora Capensis*,' by Dr. Harvey and Dr. Sonder, has also been issued with the assistance of the Cape Government. It is much to be desired that these examples of the publication of the Natural History of our Colonies under the auspices of Government should be followed out with a judicious and well-applied liberality.

The spread of the love and study of natural history, and its teaching by means of lectures and the formation of local museums, is as satisfactory in our English provinces as I last year described it to be in Ireland. At Leeds, the sum of nearly £8000 has been raised for enlarging and improving the museum belonging to the Literary and Philosophical Society, which, owing in great measure to the efforts of the Rev. T. Hincks, is rapidly acquiring importance. The collections there are both extensive and interesting. Two volumes of '*Transactions*' have been published in former years. The County Museum at York is an admirable one, and very useful lectures are delivered there. At Newcastle-upon-Tyne, there is the nucleus of an excellent museum, "which," says my informant, "is extending by the efforts of some energetic young men, aided by a legacy from the late Robert Stephenson and donations from Sir William Armstrong and others. There is also a flourishing Microscopical Society, and other institutions having more or less the object of the cultivation of natural history." The Tyneside Naturalists' Field Club is a society of very respectable standing, and, as I have long known, admirably conducted. The number of members was at Christmas last no less than 345, and it is still steadily increasing. I have seen several parts of the '*Transactions*,' which are highly creditable, and no papers are published but such as are strictly on local subjects. Similar institutions, as I am informed, exist at Manchester and some other places.

The well-known Literary and Philosophical Society of the last-named city still keeps up its character, and a Microscopical Society in the same place is also in active operation. The details of the working of the society, especially on the products of the deep-sea soundings, are highly interesting, and but from a desire not to detain you too long, I should have willingly devoted a few minutes to their enumeration.

At Alton in Hampshire, at Bedford, at Wakefield, and many other places distant from the Metropolis, as well as in the suburbs, societies having these objects are established; and even in the far Orkneys a Natural History Society is actively engaged, under the direction of the Rev. Mr. Stobbs, in forming a complete collection of local objects of natural history. If I glance at the vast improvements in Kew Gardens and the increased number of visitors there, as well as at the Zoological Gardens, I have laid before you sufficient proof of a vast advance in the popular recognition of Natural History as a rational source of enjoyment.

I return now, Gentlemen, to our more immediate interests. It had long been felt that considerable advantage might be anticipated from the appointment of a second secretary instead of the under-secretary recognized by the bye-laws, and that one of the two secretaries should be considered as representing the Zoological and the other the Botanical element in conducting the business of the Society. As this arrangement would require an alteration in the bye-laws, and as the whole of our code was thought to demand a revision, for which we were not at the time prepared, Mr. Busk kindly consented to act as the Zoological Secretary, under the title of under-secretary, until the retirement of Mr. Bennett from an office which he held for twenty years, with a zeal and constancy and talent which laid the Society under the deepest obligations to him, whilst his unfailing courtesy and kindness endeared him to every one who was brought into connexion with him. I hope I shall be pardoned a momentary digression, whilst I congratulate the Society and our friend himself upon his comparative restoration to health, and upon his being able once more to cheer us by his occasional presence amongst us, and in particular by his valuable assistance in the Council.

At this time Mr. Busk being elected Secretary, Mr. Currey allowed us the advantage of his services under the old title, until that alteration of the bye-laws, which you have recently confirmed, enables you this day to elect him as joint Secretary with Mr. Busk. It is not necessary for me to enter into any detail on the subject



of these alterations. They were made by the Council after the most mature deliberation, and I believe that every one who compares their present with their past state will acknowledge that every change has been an improvement.

The vacancy occasioned by the much-regretted retirement of Dr. Boott from the office of Treasurer, has been proposed to be filled up by the nomination of Mr. Wilson Saunders—an arrangement which needs no recommendation from me to secure the cordial approval of the Society. But, to my sorrow, I have to announce that, whilst retiring from office, Dr. Boott has also signified his desire not to be re-elected into the Council, a circumstance which will be felt by the whole Society as a serious loss.—After having acted as Secretary and as Treasurer for many years, during which his services in both capacities, and as a member of Council, were invaluable, whilst the gentle urbanity of his manners, his warmth of heart, and the never-failing interest he always took in the welfare of the Society caused him to be regarded with the deepest personal esteem and respect, his removal from a position which kept him, as it were, in continual and close relation to us, will be felt by us all as a very painful breach in our brotherhood.

Before I take my leave, Gentlemen, I cannot but advert for a moment to the very important duty which will devolve upon you this day—the choice of a new President. When, from circumstances with which I have no occasion to trouble you, I decided upon inflicting on myself the severe self-denial of requesting the Society not to re-elect me as their President at this Anniversary, I considered it my duty to confer with the Treasurer and some other of the older members of the Council as to the gentleman whom I should propose as my successor. The first consideration was, that he should be a Botanist, and it appeared to me and to my friends and consultees, that there could be no hesitation as to the distinguished person who should be proposed to the Council for their nomination. Mr. Bentham's extensive—may I not say unequalled?—knowledge of scientific botany is too well known to need any eulogy from me. We have all for years past been accustomed to listen with admiration to his papers in this room, and to the good sense and extensive information which he has thrown into our discussions.

But there is one claim which Mr. Bentham possesses to the suffrages of the Linnean Society in particular, on which no one is more entitled to speak than myself, and that is the remarkable

wisdom, knowledge of business, and tact which have always distinguished him in the Council, and for which I now beg leave to express most strongly my own obligations and those under which the Society at large lies to him. I hope Mr. Bentham will accept the assurance of my most earnest wishes that he may long continue to occupy a chair which he is so well able to fill; and that, while the Society enjoys the benefit and prestige of his Presidency, he may ever receive the same confidence, the same kind consideration, the same affectionate attachment, as that with which for the last eight years I have been honoured.

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### OBITUARY NOTICES.

The Secretary then read the following notices of deceased *Members*.

*George Earl of Aberdeen*, whose name for the last twenty-five years has stood at the head of the list of Fellows, died on the 14th December, 1860.

The well-known public character and career of this distinguished patron of literature and art, and the absence in him of any pretension to scientific fame, render it unnecessary here to do more than express the deep sense which this Society, in common with the whole British Empire, cannot fail to entertain of the great public loss sustained by the decease of one so long eminent as a statesman and so distinguished by the excellence of his public and private character.

*Robert John Ashton, Esq.*, was by profession a solicitor, residing at Pelham Crescent, Brompton, and having chambers in New Inn. He was the eldest son of Robert Ashton, Esq., of Brompton, by Mary, daughter of J. A. Schwenk, Esq., and was born at Brompton in 1812. Educated by the late Rev. Dr. Lewis at Twickenham, he was admitted a solicitor in 1836.

As he was possessed of good independent property, he followed his profession more as a means of occupation than of profit, and in the exercise of his avocation the strong tendency of his mind to scientific and antiquarian pursuits led him to cultivate law as a science, and to investigate the intricacies of titles rather than to engage in active practice.

Mr. Ashton was a good classical scholar and well versed in the German and French languages; but the natural bias of his mind was better exhibited in scientific and antiquarian studies, and especially in that of natural history. Thus chemistry, botany,

entomology, geology and numismatics successively occupied his attention. He became a member of the Entomological Society in 1835, and contributed some valuable papers in the second and third volumes of its 'Transactions.' He was elected a Fellow of the Linnean Society in 1839.

Mr. Ashton was possessed, according to his biographer in the 'Law Times,' whence I have taken this short account of his life, of no ordinary mental powers, great originality of thought, and was familiarly versed in biblical lore. Of strong religious feeling, he took a lively interest in most of the popular religious societies of the day; at the same time he was a man of strict integrity, charitable, upright and uncompromising almost to a fault.

He died at Richmond, on the 26th of August, 1860, at the early age of 47, and was buried at Kingsbury, Middlesex.

*Philip Edward Barnes, Esq., B.A.*, occupied the post of Danish Consul at Coquimbo. He was the son of Mr. Philip Barnes, an old Fellow of the Society, and one of the originators of the Royal Botanic Society, in whose service his son was at one time engaged as Assistant Secretary.

Mr. Barnes was elected into the Society on the 18th of December, 1838, and died at Copiapo, Chili, on the 2nd of October, 1860.

*Bracy Clark, Esq.*, the "Father of the Linnean Society," died on the 16th of December, 1860, at the advanced age of 90, having retained his faculties in almost full vigour to the last. In his own profession he was esteemed one of the most eminent, if not the most eminent, of veterinarians. At any rate, he was one of the first in this country to apply the resources of a liberally educated and well-informed mind to the study of the veterinary art, which, since the establishment of the college, has deservedly been admitted into the rank of a profession. He was born at Chipping Norton, in Oxfordshire, on the 7th of April, 1771, the ninth and last child of his parents, who belonged to the Society of Friends, and both of whom died within a few weeks of each other, before their youngest-born was two years old. He was left under the guardianship of a near relative, Mr. John Zachary, and at 8 years of age was placed at school at Barford, where he had a favourable opportunity of acquiring classical knowledge, and had among others for contemporaries, Luke Howard and Sampson Hanbury—names since as much distinguished as his own in their respective walks.

When 14, he was apprenticed to a surgeon at Worcester, under whom and his successor, he continued to improve his classical knowledge, and acquired a practical acquaintance with the art of

medicine. During this period, he took great interest in chemical and mechanical pursuits, and is said to have constructed several ingenious machines.

His earliest predilection in natural history was for the study of entomology, and he made an extensive collection of the insects found in the neighbourhood of Worcester; but though he was doubtless animated by a strong love for this branch of knowledge, the scientific principles by which he was guided are not very obvious, when we find it recorded that he would not admit any insect into his collection but such as had been described by Linnæus; any new forms apparently being regarded by him as unauthorized interlopers. To entomology he soon added botany, as it was then understood, as an object of pursuit; and these tastes appear to have been beneficial to him in more ways than one; for besides the useful and instructive training his mind thus received, his pursuits were the means indirectly of introducing him to a more refined and intelligent, or at least more learned society, than might otherwise have been accessible to him.

At the end of his apprenticeship, and when he had reached the age of 21, Mr. Clark proceeded to London, with a view, apparently, of pursuing his medical studies. Through his guardian, Mr. Zachary, he was introduced to the notice of Sir Joseph Banks, under whose auspices, probably, he was elected a Fellow of this Society on the 15th of January, 1793—that is to say, within about five years of its foundation.

His medical studies were commenced under John Hunter, whose place, however, in Windmill Street, was about that time supplied by Sir E. Home, and he had for fellow-students amongst the famous dead, Thomas Young, Anthony Carlisle, Abernethy, and Astley Cooper, and of the illustrious living Mr. Lawrence, who still remains amidst us in almost unimpaired vigour and activity of mind and body. But, although Mr. Clark appears to have regularly attended the medical classes, his choice from an early period was to devote himself to the veterinary art, to the practice of which his medical and scientific studies were the best possible introduction. To this he was incited by his elder brother Mr. Henry Clark, who was a lover of horses, and noted in the sporting circles. In the pursuit of his special branch, he early attached himself to the Veterinary College, about that time established in St. Pancras, and into which Mr. Clark used to mention with delight, that he officially led the first horse as a patient.

In the year 1797, he resolved to visit one of his sisters, who was

married and settled at Lausanne. On the passage to Hamburg, however, in a Yarmouth packet-boat, the vessel was captured by an American privateer, and taken into a Dutch port, where the passengers received some hard treatment, and were robbed of all they possessed, though Mr. Clark's loss fortunately does not appear to have been heavy. He remained on the Continent for about two years, and travelled through Holland, Denmark, Germany and Switzerland at a time when travelling was not quite so easy as in the present peaceful times; and many testimonials are extant of the consideration he obtained among men of science for his industry, intelligence, and energy. Having in vain endeavoured to obtain permission to enter France with the view of studying at the celebrated veterinary schools of Paris and Lyons, he returned to England, and commenced practice in London, where he soon attained the most eminent position in his profession. In the course of his practice he appears very early to have felt that it was out of the natural order of things that horses should, after some years' usage, so often become *lame*, a term under which he included every defect in stepping, and in the detection of which he possessed a very keen eye. In his '*Hippodamia*,' he has left a very interesting account of his researches into the cause of this lameness, which were rewarded by a discovery, in his own estimation at any rate, "second to none that has ever been made on the subject of horses." This was what he termed the "principle" of the elasticity or expansibility of the animal's foot. This so-termed "principle," however, had been previously recognized by Mr. Freeman in his work on the '*Mechanism of the Horse's Foot*,' which was published in 1796. At the present day, we can only wonder that so obvious a fact should ever have been overlooked by the most barbarous farrier, and that it should have been reserved for the last sixty or seventy years to erect it into a "principle."

The application, however, of this "principle" in the shoeing of horses seems to have been a more difficult problem than its discovery, and to have engaged the attention and laborious ingenuity of many veterinarians. Mr. Clark was occupied more or less in the solution of the question up to the last year of his long life, and, in fact, his experiments in this regard appear to have absorbed no small portion of the very considerable gains he made by the practice of his profession. His zeal in this subject we cannot perhaps wonder at, when we learn that, in his opinion, the horse would attain to the age of fifty, were it not for the cruel sufferings occasioned by the imprisonment of its feet, the cutting of the *frog*,

and the otherwise cruel treatment experienced by it at the hands of smiths in general.

Among Mr. Clark's published works should be enumerated, first, his papers published in our 'Transactions,' consisting of 1. "Observations on the Genus *Æstrus*," which was read November 1st, 1796, and published in the third volume of the 'Linnean Transactions.' 2. "Of the Insect called *Oistros* by the Ancients, and of the true Species intended by them under this appellation; in reply to the Observations of W. S. Macleay, Esq., and the French Naturalists: to which is added a Description of a new Species of *Cuterebra*" (*Ibid.* vol. xv. pp. 402-411); and 3. "An Appendix or Supplement to a Treatise on the *Æstri* and *Cuterebræ* of various Animals" (*Ibid.* vol. xix. pp. 81-94; and Proc. Lin. Soc. vol. i. pp. 99-100). The "Observations on the Genus *Æstrus*" were republished in an amplified form, in 1815, under the title of 'Essay on *Æstri*.'

Mr. Clark's first appearance as an author, however, was in the 'Gentleman's Magazine,' where he gave "A short Account of the celebrated Race-horse Eclipse," which was written in so lively and pleasing a style as to attract considerable attention.

Among his numerous other works may be mentioned his elaborate treatise on the 'True Structure and Economy of the Horse's Foot;' his 'History of the Veterinary Art;' a 'Treatise on the Bits of Horses;' and a 'Memoir on the Vices of Horses;' an 'Essay on the Knowledge of the Ancients respecting the Art of Shoeing the Horse;' all of which, to borrow the words of his biographer in the 'Edinburgh Veterinary Review,' "testify to his untiring perseverance, devotion to veterinary science, and his profound knowledge of the subject."

To conclude in the words of the same writer, who is far better entitled than I am to express an opinion, "Few men have had the privilege of working or writing in true earnest for the length of time that Bracy Clark laboured in the cause of veterinary science. The progress in the purely scientific department of that profession in this country during the last seventy years has been due almost entirely to Bracy Clark. The reputation of British veterinarians on the Continent is mainly attributable to his efforts."

William Henry Fitton, M.D., F.R.S., F.G.S., died on the 13th May, 1861, at the advanced age of 82. Though never a contributor to our 'Transactions,' no man was better known or more warmly esteemed than Dr. Fitton in all scientific circles. Justly eminent among geologists, he may be regarded as one of the earliest and

most zealous founders of the British School of Geology. His early labours, commencing more than half a century ago, on the geology of Hastings and its neighbourhood, and these, together with his works on the strata intervening between the chalk and oolite in the South-east of England and in the Isle of Wight, published as they were at an early period in the history of the science, speedily raised Dr. Fitton to a European reputation, which was not only maintained, but enhanced by his subsequent career.

In 1827 he became President of the Geological Society, in which capacity he was the first to set the laudable and useful example, since so amply and ably followed by his successors, of giving an annual *résumé* of the general progress of the science. In 1852 he received the Wollaston Medal, presented to him by the Society for his eminent scientific services. Besides his strictly scientific publications, Dr. Fitton contributed several articles on the early history of geology to the 'Quarterly Review' and other periodicals.

*John Stevens Henslow.* As I feel that it would be impossible for me to do equal justice to the subject of the following notice, or to express in anything like such adequate terms what is due to the memory of Professor Henslow, I have thought it better, with the due permission, to insert in the records of the Linnean Society, the eloquent and complete account of his life and labours contained in the pages of the 'Gardeners' Chronicle' for June 1, 8, and 15, 1861.

"There are few men whose loss will be more generally deplored, whether as a clergyman or as a man of science, than the subject of this notice; nor are these his only claims to be regarded as a benefactor of his race, for there are few whose personal influence for good on the social, moral, and religious characters of those with whom he has been associated or laboured, has been so deeply felt or so gratefully acknowledged. To give even a sketch of the varied attainments and personal qualifications that were so blended in Prof. Henslow as to render him at once the most popular and useful man of science of his day, is quite impossible here; for they depended on a combination of rare qualities of head and heart; each natural, but all well trained and conscientiously cultivated by their possessor during a long period of his life. Amongst them, however, should be mentioned some personal and other features, which, as being in a great measure due to temperament and mental endowment, were inherent and characteristic of all periods of his life: these were a sense of truth and fair play, so instinctive, that deception or even reticence when the cause of truth was at stake

were things almost unintelligible to him ; a geniality of disposition that rendered him an attractive companion from his childhood upwards ; a temper of which he was never known to lose command, even by his most intimate friends ; an organization of brain that rendered all subjects of study equally easy of acquirement ; a keen love of nature and of natural knowledge, and ardour in communicating it ; a quick perception, excellent powers of generalisation, the largest charity, a total absence of vanity or pride, a winning countenance, and a robust frame. Few men indeed were more gifted by nature to take a commanding position in the many spheres of life, in one or other of which he was always busy ; few had more need of that balance of powers of mind which his University tutors recognised as something unusual, and the phrenologists accounted for by the form of his head, which they considered faultless. That this is no exaggerated estimate of the subject of this sketch, the following brief notice of his career will prove.

“He was born on the 6th of February, 1796, at Rochester, where his father was in business as a solicitor, the eldest of eleven children, of whom four sisters only survive him. His scientific powers and love of natural history, which were very early displayed, were inherited both from his father, who was a great reader of natural history books, and devoted to the observation and keeping of birds and other animals, and from his grandfather, Sir John Henslow, surveyor of the navy, who united to a scientific knowledge of naval architecture, great ingenuity and skill in designing. He was educated first at a free school in Rochester, and afterwards at Dr. Jephson’s, of Camberwell. During the former period he delighted in making excursions on the Medway, and especially in hunting for insects, and in rearing them and observing their habits. It was during the latter period that he first learned how to arrange and systematize ; and the delight in analysing, understanding, and illustrating, gradually equalled that of collecting ; and these were thenceforward the ruling passions of his life.

“In 1814 he was entered at St. John’s College, Cambridge, and graduated as 16th Wrangler in 1818, in which year also he joined the Linnean Society. During his college career he continued an active naturalist ; declining to compete for the much higher academic position which, with his mathematical powers, he might easily have attained, he preferred substantial knowledge, studied chemistry under Prof. Cumming, mineralogy under Dr. Clarke, laboured hard at geology as an original inquirer with but little aid, and became a Fellow of the Geological Society in 1819.



“In 1821, at the early age of 23, he appeared as an author, communicating to the Geological Society his ‘Supplementary Observations on Dr. Berger’s Account of the Isle of Man,’ containing a map and sections, to the preparation of which he had devoted his spare time whilst spending two long vacations on that island with pupils. At about that period the same duties also led him to the Isle of Anglesea, the geology of which he diligently explored, and embodied the results in a most elaborate paper, printed in the first volume of the ‘Cambridge Philosophical Transactions.’ This paper not only at once raised its author to a very high position, and caused such a demand for the volume in question that it was soon out of print; but it is to this day quoted by geologists as a model of truthful and sagacious scientific research. It possesses also rare merit, as combining with great power of co-ordinating physical features, skill and accuracy in the application of chemistry, mineralogy, mathematics and drawing to the illustration of a very complicated mountainous region.

“At this period, too, his physical powers were equal to his mental; and during his geological excursion in Anglesea he once walked 40 miles in the day, with his hammer and specimens on his back, and danced all the following night at a ball!

“About the same year Professor Henslow took up botany with the same zeal and method which he had devoted to other branches of science, being, it is believed, first attracted to morphology and physiology. He soon, however, found that no satisfactory knowledge of these branches could be acquired without a previous acquaintance with systematic botany; and this, joined to his ardour for collecting, led him to the formation of a herbarium, in which he displayed not only the specimens, but the structure of their organs, their relations, variations, and aberrations. In 1822 the Professorship of Mineralogy becoming vacant, he became the successful candidate; he held the appointment for three years, conscientiously devoting the whole of his time to the study, and especially to the chemical and crystallographical branches of it, for which his mathematical powers and previous training eminently qualified him. He prepared and published an admirable syllabus of his course of lectures, followed by a systematic list and analytical tables, drawn up with the same scientific precision and clearness that characterize all his labours.

“In 1825 the Professorship of Botany became vacant by the death of Professor Martyn, and for this Professor Henslow resigned the mineralogical chair; applying all his energies and ma-

nifold acquirements to his new post (which had been wholly neglected for many years), and speedily raising it from obscurity to renown. He immediately arranged a course of lectures at once scientific, practical and popular, gave chemistry and physiology their legitimate places in botanical teaching, and, by applying his mathematical powers in giving a prominent place to the geometrical problems involved in phyllotaxis, he awakened interest in a study to which some of the mathematicians of Cambridge had hitherto hardly accorded the dignity of a science. Nor did he neglect the more practical duties of a teacher; no one knew so well as he did that to make botanists of students they must quickly be brought to believe that in some directions, at any rate, they can and ought to walk unaided; he therefore took them on excursions, taught them early how to name plants by an artificial use of the natural method; gave each confidence in his earliest efforts, and led them on by example, teaching and encouragement. Nor did botanists and undergraduates alone profit: his lecture room was attended by senior members of the University, and his excursions by entomologists, conchologists, and geologists; each deriving knowledge in his own speciality from him, and he from them: thus exciting amongst his pupils an admiration for his manifold acquirements that was only equalled by their love of his personal character.

“For 14 years Professor Henslow resided at Cambridge as botanical professor, during which period the income attached to the chair was very small; this was, however, no obstacle to his instituting weekly evening meetings at his own house for the reception of every one interested in science, including under-graduates; to which all were invited to bring specimens of interest in any branch of science; and at which there was free intercourse between young men and ‘dons’ of every degree. This practice, previously unknown in the University, and, we regret to say, as yet unfollowed, was a step of immense importance in diffusing a taste for science, no less than in inciting the young men to intellectual pursuits.

“During this period he contributed two papers to the Cambridge Philosophical Society on a hybrid *Digitalis*, and the structure of the Mignonette, both of the highest merit as works of philosophical research, and which established his reputation amongst continental naturalists: he also wrote the volume on Botany for Lardner’s ‘Cabinet Cyclopædia,’ an admirable little work, of which two editions have been sold, and a third was under revision at the time of his decease. It is a noticeable fact, that since Professor

Henslow's departure from Cambridge, not a single botanical paper, and very few on other branches of natural history, have been contributed to its Philosophical Transactions, of which he was one of the founders.

" In 1823 Professor Henslow married a daughter of the Rev. George Jenyns, of Bottisham Hall, in Cambridgeshire; and in 1825 he took orders as curate of Little St. Mary's, in Cambridge. In 1833 he was presented by Lord Brougham, then Chancellor, to the Vicarage of Cholsey-cum-Moulsford, in Berkshire, where he resided during the summer months of three years, passing the rest of his time at Cambridge as before. In 1837 he was transferred by the Crown to the valuable Rectory of Hitcham in Suffolk, and there from 1839 until his death, he resided throughout the year, with the exception of six weeks of the Easter term, when he lectured during the week in Cambridge; for many years returning to Hitcham for the Sunday service.

" To the duties of his new position Professor Henslow brought the same energy, and the same love of bettering his fellow-creatures as had distinguished him in Cambridge, together with increased fervor for teaching, matured faculties, and a deep sense of his responsibility in ministering to the spiritual and temporal wants of a large and woefully neglected parish. His flock were notorious for belief in witchcraft, drunkenness, poaching, sheep-stealing and other immoral habits; they consisted of field labourers living in wretched hovels, and of farmers, who, being intellectually little better than their servants, were doggedly opposed to any change in their moral or physical condition. Here was work requiring all Professor Henslow's indomitable energy and multifarious resources; no one knew better than he what is the result of throwing good seed on stony ground, and he consequently laid his plans for tilling and fertilizing the ground committed to his culture with such sagacity and skill, and carried them out with such unflinching steadfastness of purpose, that within less than a quarter of a century he reaped his reward hundred-fold, and died with a harvest garnered. It is quite impossible to estimate the amount and kind of moral courage required for a clergyman to break down the sturdy opposition to change of the farmers of twenty years ago; but his neighbours had to do with one who never determined on a plan of action without carrying it into successful effect, and whose downright honesty, frank bearing, and imperturbable temper, were weapons proof against the outbursts of prejudice, avarice, and malice with which he was assailed.

“ On Professor Henslow’s arrival at Hitcham the parish consisted of upwards of 1000 persons, scattered over more than 4000 acres ; and the poor-rates amounted to 27*s.* per head, women and children of all ages included ! Moreover parish relief was not unfrequently levied by bands of 40 or 50 able-bodied labourers, who intimidated the previous rector into instant compliance with their demands. The church was all but empty, and baptism and the marriage ceremony were practically regarded as superfluities or luxuries ; whilst with regard to food, clothing, and the means of observing the decencies of life, the inhabitants were far below the average scale of the peasant class in England. His first step was to attach the labourers to himself, and induce them to regard him as a friend. For this purpose, being a capital pyrotechnist, he invited them to the rectory lawn in the evening and amused them with fireworks, and then gradually introduced to their notice many simple objects of domestic use hitherto unknown to them ; and having once gained their confidence he lost no time in setting to work on a plan that should tell at once both on their bodies and minds ; knowing well that it would be necessary to raise their condition to that of rational beings, and secure some feeling of independence among them, before he could act with effect on the class which held them in bondage. To this end he caused a school-room to be built, and a mistress appointed—both on a very humble scale, for he had but slender support from his parishioners ; indeed, greatly as the building and the stipend of the mistress are now increased, it has been mainly through his liberality ; his subscriptions having often doubled those from all other persons. In the school he so arranged the method of teaching, that the sympathies as well as the faculties of the children were aroused by a combination of the religious and secular elements. The children were taught their duty to God, to one another, and to themselves ; the latter by means that were long thought Utopian, but are now recognized as efficacious beyond precedent ; we allude to the introduction of Natural History as a means of sharpening the observing and reasoning faculties, and giving the children an increased reverence for their Creator’s power, a knowledge of common objects, and a pursuit in which they can take equal interest in the fields or at home.

“ Professor Henslow’s method of teaching village children botany, and the success that has attended it as an educational measure, quite apart from the information given, have often been noticed ; it is now the theme of universal praise, it has been taken up by

the Council of Education, and is being carried out in various parts of the country. We cannot here dwell on its manifold advantages to an agricultural people, how it influences their daily habits in after-life, as well as advances their material interests as rearers of vegetable produce; and we must refer to the numerous volumes of the 'Gardeners' Chronicle' in which accounts have appeared, some by Professor Henslow himself, of the working of these and other educational and social measures.\*

\* As an exemplification of the methods employed by Prof. Henslow for the gaining of the affections, and amusing and instructing the minds of his humbler parishioners, we subjoin the following interesting sketch of some of the pleasures of a visit to Hitcham about eight years since, which appeared in the 'Literary Gazette' of July 9, 1853, from the able pen of Mr. Lovell Reeve.

"A VILLAGE FLOWER-SHOW.

"IN a quiet corner of rural England dwells a pastor of the Established Church—an eminent teacher of botany—whose educational views, sprung from a mathematical university, have bent with peculiar grace to the influence of his professional pursuits. For him the lilies of the field are as ministering elements of thought and feeling, serving to rear up the minds of his flock in notions of comeliness and order; and to draw lessons from plants and other natural objects, is with him a treasured step towards the development of an observant and godly intellect. Let us see how far his village flower-show of Wednesday last, more pleasurable after its kind than even the glories of Chiswick, confirms the spirit of his teaching.

"The ruling principle of the 'H—— Labourers' and Mechanics' Horticultural Society,' is, that every member should feel his independence as a contributing subscriber. They are of the very poorest class. Few, very few, alas! of the parents are able to read or write. The subscription is *sixpence per annum*, and out of this small fund two annual shows—one of flowers and one of vegetables—are held with great rejoicing in the grounds of the Rectory. Prizes varying from 2s. 6d. to a pinch of white snuff—*i. e.*, peppermint lozenges—are offered by the rector, gentry, and farmers, to the most successful cultivators, and the award of the judges is looked forward to each year with as much competing excitement as the gold and silver Banksian and Knightian medals of the metropolis. There is, however, one important advantage which this Society has over those of London. It gives prizes for Wild Flowers. Here, Flora is not so drugged, and forced, and tricked out with hoops and flounces. Her meretricious adornments of paint and patchwork are unknown in the pastoral village of H——. Her botanical charms are here fresh and uncorrupt. She doesn't linger in heated rooms, and come forth an unblushing jade, all blossom, with her retiring mantle of foliaceous green cropped to the shortest possible dimensions. She breathes the atmosphere of heaven, lurks beneath the tinkling sheep-bell, peeps out modestly from the hedgerows, and is plucked by tiny hands for the sake of the lessons she gives. As the seasons come round, the children of H—— go into the fields to gather wild flowers, and a faithful record is kept and printed of the parish flora. Hard names, such as monocotyledonous and inflo-

“ In 1838 ploughing matches were introduced, and applauded by the labourers ; it might have been supposed by the farmers too ; but with characteristic obstructiveness they for many years continued to throw in the apple of discord, and rendered fair play impossible. Upon this Professor Henslow took higher grounds, and

rescence, are as familiar to them as household words. They are engrafted on the memory by their continual practical illustration. The spelling-book gives them names equally hard and important, such as ple-ni-po-ten-ti-a-ry and ag-grand-ize-ment, but as these things are unfamiliar and have no practical illustration among them, they are forgotten almost as soon as learned. Of Wild Flowers, a prize of 1s. and four of 6d. are offered for the five best nosegays, not exceeding 18 inches by 12, prepared by children between eight and fourteen years of age ; and a prize of 1s. and two of 6d. for similar nosegays from children under eight years of age ; and three prizes of 2s. 6d., 2s. and 1s. 6d. are offered respectively to the children of the parish school who shall answer best some questions about the local wild flowers. There is, however, an important N.B. in the corner of the prospectus. The children who compete for botanical honours must have received a ticket for regularity of attendance at either Day or Sunday School.

“ The day approaches, and great are the preparations at the Rectory. On the broad green lawn, skirted with lofty elm trees,—God’s house in the distance,—are being erected tents and booths, round-about and see-saws. The ladies, ever forward in works of charity and kindly encouragement, are preparing all sorts of embellishments—flags of divers patterns, not intended to brave the battle, but only the breeze, and rosettes of economical pseudo-satin, pinked to perfection, to dignify the stewards ; and it is whispered that the servants are preparing a surprise. All that is to be seen in the kitchen at present are the little bags of Congou, milk, and sugar, in solution, brewing in a mash-tub ; and mountains of good brown cake sufficient for a feast of ogres. The day arrives, and the village botanists are sauntering up the long walk with the produce of their rambles. Presently they are buzzing under a group of horse-chestnut trees, making up their nosegays—eighteen inches by twelve—and anon they show them in the exhibition booth, in the quaintest possible stands—from a ginger-beer bottle to a cocked-hat Damon of the time of Watteau, with his arms akimbo, looking as proud of his load as a Linnæan herbalist. Opposite to them are arranged the fuchsias, geraniums, roses, pinks, stocks, pansies, annuals and perennials, nosegays and device nosegays, and at the end the rustics are peeping with astonishment into a polyorama and a stereoscope. On the opposite side of the green is a tent devoted to general curiosities. Eggs of alligator, and eggs of ostrich, eggs of humming-birds, and eggs of some other wonderful birds incubating lilliputian cottages in yolk of shells and moss, casts of Echini in their flinty matrices and Echini in chalk, vegetable ivory, from the nut to its process of turning into pin-cushions and umbrella handles, ammonites and nautili, bright enamelled shells of all kinds, butterflies and scorpions, grasses and sedges, lace bark and chocolate in the pod ; but it is beyond our memory to enumerate the specimens of this instructive museum, all set out and stored away again in one day by the busy Professor in his St. Albans hat of plaited straw. The company has arrived, and probably eight hundred or more, some in fustian and coarse print, some in surtout and gros-de-naples, are assembled on the lawn, the carriage gentry

matured his plans for extending a system which would strike at the root of agricultural slavery, and for which he had been for ten years struggling with but very slender success: this was the allotment system, which from the time of his first proposing it, had met with the fiercest and best organized opposition. To pro-

driving up to the house to exchange congratulations with the host and hostess. The servants have brought out their surprises. Upon the booth is seen a triumphant display of loyalty,—‘God save the Queen,’ in daisies of emblematic white upon a laurel background. Over the door is a monster vegetarian, the counterfeit presentment of an agriculturist, spade and fork in hand, built up of laurel leaves, be-buttoned with daisies, and with a face rudely made out of jocund roses. Lastly a richly laurelled throne is brought out, something between a sentry-box and a pulpit, and into this the Rector-Professor mounts to distribute the prizes. The giving of each prize is accompanied with praises and criticism, according as either is needed. The fuchsias are pronounced to be excellent, the pinks not so good. ‘You must improve their cultivation,’ said the Professor, ‘by the next show. In having such jagged edges they look too much like cloves. They look as if they had been jumping through the brambles and had torn their petticoats.’ The failing characteristic was understood in a moment. The wild-flower gatherers now stand round to receive their prizes, and to be asked questions. It was announced that one little girl had added twelve new species to the flora of Hitcham during the past year,—twelve, not brought haphazard with a heap of others, but detected separately in the field as not being in the printed catalogue, and not hitherto known to the University Professor of Botany as being inhabitants of his parish. Plants from the West of England, not before seen by the little botanists, were then shown to them, and the class, family, and genus were told without hesitation; and when asked to what plant known to them they were related, the allied local species was named, though differing in general aspect. The plant was determined alone by its scientific characters. The prizes were awarded, and it did one’s heart good to see the little bob curtsy and intelligent simper that accompanied it. A present of botanical boxes was promised to be given on the morrow. The banquet of tea and cake for the three hundred horticulturists who had taken penny tickets, and a hymn of loyalty and grateful interchange of huzzas between master and servants, concluded the proceedings. The parting adieu is still tinkling gently in our ear.

“But a yet more interesting sight awaited us. On the morrow we visited the parish dame-school. The forms were crowded with children, the girls neat and intelligent, the boys somewhat quaintly clad and drowsy. As the Professor appeared at the door, also a little quaint, in his straw hat, with a rough hoe for a walking-stick, the pinafores botanists, who seemed to congregate by instinct, stood up to receive him. At one end of the room was a cupboard, overlooked by a print of Joseph cast by his brethren into the pit, containing the parish herbarium. It consisted of dried specimens of the flora of Hitcham, neatly arranged and named, and outside on a board hung the printed catalogue of reference. Opposite to it was a large A B C table and some views of the Crystal Palace. At the other end of the room was the vivarium or collection of living specimens. Each plant

vide the labourer with the means of improving his condition, and secure to him as an irrefragable right, what alone offered a prospect of keeping him from the workhouse when unemployed by the farmer, and from the beershop when disposed to be idle, was an object worth every effort on the part of the rector; and in 1849, by dint of his indomitable moral courage and determination, he succeeded in establishing no fewer than fifty quarter-acre allotments in the parish. For several years the battle raged, but with the aid of one or two staunch supporters—honourable exceptions to the mass—he overcame all difficulties, and finally almost tripled the number of allotments. Throughout the whole of this agitating period Professor Henslow preserved not only a calm, but a conciliatory bearing: he announced himself from the first as a champion of the rights of the poor, sought no quarter himself, but gave it liberally to all the vanquished; he printed and circulated

was contained in a separate phial of water, and two or three hundred or more, all fully labelled, were arranged along the wall in wooden shelves drilled for their reception. The prizes awarded to the most successful field botanists were now brought out for distribution. They were of three classes—botanical boxes, pocket lenses, and cases of forceps. The little villagers received their philosophical instruments with a shrewd appreciation of the use of them, and brought them to bear on a dissection of the products of the day with the dexterity of a Hooker or a Lindley. The forceps was lifted to separate the sepals and petals, the lens to examine the number of pistils and stamens, and class, order, and genus were determined by the competing botanists in a moment. ‘They beat my Cambridge boys,’ said the Professor. ‘We don’t trouble ourselves here about the Artificial system of botany; we jump smack to the Natural.’ One little girl had detected a species of reed grass new to her. It was new, as occurring in this locality, to the Professor. It was new even to his own private herbarium, and rare in all England. A liberal pinch of white snuff from Pandora’s box was the welcome reward. The girls were now examined as to the general characters of plants. A specimen was held up and systematically pulled to pieces, and the questions put were promptly answered in the course of the dissection. All we can ourselves remember is a lifting of the forceps, a quizzing through lenses, a general consultation and whispering, and the simultaneous echo now and then of such words as ‘tetradynamous,’ ‘hypogynous,’ ‘polypetalous,’ ‘syngenesious,’ and the like, learned out of a printed formula, which, owing to the assistance of the bountiful goddess hereinbefore mentioned, had proved much easier to them than the multiplication table. ‘They beat my Cambridge boys hollow,’ again remarked the Professor, with a smile. In conclusion, all kneeled down on the clean brick floor, to repeat a short prayer to the gracious Giver of plants that open out spring lessons for intelligent minds, and we went out thoroughly impressed with the importance of nature-teaching, even in this sequestered pastoral spot. We would have given the world at that moment for some claim to a share in the blessing that followed the Reverend Professor home to the Rectory.”



one sharp rebuke addressed to the farmers, which informed them of his intention of abiding by his own resolves, and declining their dictation. The success of the allotments is now complete, and the Hitcham allottees have on several occasions distanced all competitors in the excellence of their produce.

“ We cannot here do more than allude to the various well-organized methods by which Professor Henslow gradually raised the condition of the people committed to his charge, and which, without one exception, were flourishing at the period of his decease. Of these the ‘Recreation Fund’ has naturally been the most popular; it originated in his suppression of the annual tithe dinner given by the rector to the farmers in one of the public-houses, and which was always a scene of disgraceful drunkenness. In 1849 he announced his determination to withhold the money for this purpose, and to employ it in giving an excursion in which the best-conducted of his parishioners should join: short excursions in the neighbourhood excited a desire for more distant ones, and by means of a small subscription amongst themselves, aided by larger ones from the rector’s family and some well-wishers to his plans, journeys to Ipswich, Norwich, Cambridge, the Exhibition of 1851, Kew, Harwich, and Felixstow, were organized, and carried out at the expense of a few shillings per head. On these occasions Professor Henslow often printed and circulated plans of the route, with illustrations that should serve for reminiscences of the chief objects worth seeing: he arranged with the railway directors for cheap trains, and with public and private individuals for admission to interesting places; and most generously were his exertions everywhere seconded by all parties. The plans all arranged, time-tables opened, and, with tickets in their hats, nearly two hundred villagers would assemble at dawn to enjoy throughout the day the simple and instructive discourse of one whose engaging voice never failed to draw a crowd of hearers of all ages. It is a well-authenticated fact, that, though the rustics were on all such occasions unfettered in action throughout the day, and often thirsty and exposed to temptation, there never occurred an incident of which any could be ashamed; at the termination of the day, or perhaps deep in the summer night, they would return orderly and happy to their homes, without an absentee. After one of these trips (that to Cambridge), the farmers of the parish, unable to withhold any longer some expression of admiration, united in presenting him with a silver cup.

“ We need not further refer to the village festivals and horticultural

tural shows, which have often been described, nor to the prizes given for garden produce, honey, nosegays of wild flowers, and good cultivation, together with the simultaneous amusements provided for all ages in tents on the rectory lawn, the addresses, *lectures*, parting counsels of wisdom, and chorus of 'God save the Queen.' Nor is this the place to go into the details of the 'Wife's Society,' the 'Coal Club,' the 'Medical Club,' 'Children's Clothing Club,' 'Loan Fund,' and a number of other successful expedients to encourage the villagers in practices of mutual charity, and, at the same time, habits of self-dependence. All these and much more, have been often detailed in the local papers, and in none better than the Suffolk Chronicle.

"To the neighbouring towns of Bildeston, Hadleigh, Ipswich, Bury St. Edmunds, and Sudbury, Professor Henslow most liberally extended his services in diffusing knowledge to all classes, and by every means in his power. In London he lectured but once, and then to the junior members of the Royal Family; all other invitations he refused, on the ground that there was no excuse for scientific destitution in the metropolis, and that he must economise his resources for his own neighbourhood and university. When invited by H.R.H. the Prince Consort to give a short course of lectures at Buckingham Palace, he gladly did so; with characteristic modesty attributing the selection of himself to a desire on the part of the Prince to recognize his efforts in school teaching (which would be of the greatest service towards extending his usefulness), rather than as marking his appreciation of Professor Henslow's position as a man of science. These lectures were delivered *viva voce*; they were in all respects identical with those he was in the habit of giving to his little Hitcham scholars; and the same simple language and engaging demeanour that had proved irresistible in the village, won over his Royal audience to fixed attention and eager desire for instruction.

"With the exception of Cambridge, no town owes so deep a debt of gratitude to Professor Henslow as Ipswich, whose unique museum was planned and arranged by him, and made the model of what a local museum should be in a scientific, educational, and popular point of view. He so grouped all natural objects that enough was exhibited to teach, but not so much as to confuse; and the ingenuity, judgment, and science with which he did this for all branches of knowledge, have never been even rivalled. To a certain extent the same services have been rendered to the Cambridge Botanical Museum, where, however, his efforts

were frustrated for want of space : at the Royal Gardens, Kew, he has been more successful, and the museums there owe much of their admirable method of mounting, illustrating, and ticketing, together with many valuable objects, to his unequalled talents for such work. His practice throughout life was to give the best of everything to public museums, and to retain duplicates only for himself.

“The Great Exhibition of 1851 deeply interested him, and there were few departments of it with the contents of which he was not perfectly familiar. To the succeeding Exhibition at Paris he communicated a most beautiful series of Carpological illustrations, which excited the enthusiasm of the Paris botanists, and of which a duplicate set is now in the South Kensington Museum ; where also are sold his admirable botanical diagrams for schools, with a little guide to their use, and his method of teaching botany in schools.

“For a considerable period of his life he worked with zeal at British antiquities, in which he became learned and expert, himself opening several tumuli, the contents of which he described in two tracts with illustrations. The fragments of glass, pottery, and Samian ware from these and other quarters, some of very large size, were all neatly and accurately restored by his own hands, and the best presented to the museum of Colchester.

“Every room of his large rectory, from hall to attic, presented a marvellous assemblage of instructive objects of interest, beautifully mounted with descriptive labels, to attempt conveying any idea of which would be utterly hopeless ; besides botanical and zoological specimens, economic, physiological and structural, without end, there were series illustrating many important arts and manufactures of savages and civilised beings, ancient and modern : linen, cotton, shoes, hats, candles, glass, pottery, silk, &c., all beautifully packed in boxes, and ready for use when needed. Fossils, antiquities, models of ships and machines, orreries, microscopes, weapons, crystallographical series, and philosophical apparatus of all kinds ; besides diagrams, drawings, and classified woodcuts, of which he had literally thousands, mounted and instructively arranged in classes ; and all independent of his library and excellent British entomological, conchological, and tertiary fossil collections. Let it not be supposed that these were the miscellaneous hoardings of a mere collector ; there was not one specimen that had not attached to it its history, nor that was not obtained and mounted for a purpose, and that was not in use at one or other of his frequent lectures, or placed at the service of his scientific friends.

“Tertiary geology and the recent changes of the earth's surface

before and since man's appearance, had, perhaps, a more absorbing interest for Professor Henslow than any other subject. Few persons more deeply studied and more boldly preached the Bible, or more staunchly upheld the doctrines of the Church of England; but he ever maintained the necessity of appealing to the spirit rather than to the letter of the written Word, in all cases where the established facts of science appeared to contradict the text of Scripture. In spiritual matters he avowed the total insufficiency of human reason unaided by revelation; but having witnessed many changes of theological opinion brought about by progressive discoveries in history and science, he was very averse to speculative reasoning where these were not in apparent harmony with revelation.

“His charity was nowhere more conspicuous than in his intercourse with those who differed widely, and often publicly, from himself in religious opinion. He never sought to gloss over these differences, nor did he allow of any misconceptions with regard to their true nature: but he never permitted them to influence in the smallest degree his conduct, or to diminish his admiration for what was honest and good, wherever he found it. Hence he discussed such polemical questions as the age of the globe, the origin of species, &c., with such ingenuous forbearance, that inquirers of all denominations and professions turned to him for a calm and unprejudiced judgment.

“As may be supposed, the flint implements in the drift deeply occupied his attention: on first hearing of them (their human origin he never doubted), he was disposed to be wholly incredulous as to their antiquity, and published his opinion on the subject: this was no wonder, considering how many mares' nests of the kind he had seen exposed, and himself aided in exposing. Nothing hampered by his avowed scepticism, he, with characteristic devotion to truth, earnestly took up the subject, twice visited Hoxne, where he had excavations made which resulted in a modification of his first view; he then visited the pits at Amiens and Abbeville in the autumn of last year, studied the localities and country around, the museums and collections in the neighbourhood, and returned with his views still further modified though not wholly altered. Up to the time of his last illness he was busy on this subject, comparing his observations with those of others, and studying the results, which he was preparing to lay before the Cambridge Philosophical Society. Of what his final conclusion was, no record has been published; but we believe that he had convinced himself

that the flint implements belong to a period long antecedent to that usually attributed to man's existence on the earth, though by no means so distant as some geologists suppose.

“ But it would be difficult to point out any branch of science in which Professor Henslow did not take an active interest ; he attended the first meeting of the British Association, and was ever afterwards a staunch supporter, and frequently an officer of this body ; he was one of the first examiners in the University of London, and till his death a distinguished member of its council ; he actively aided the Society for the Diffusion of Useful Knowledge, the Ray Society, and the Palæontographical Society, and was a most liberal contributor to the various charities and funds for the relief of the needy members of his own profession and naturalists in general. To poor authors, especially, he was a most generous subscriber, nor was he ever appealed to in vain in any cause the justice and expediency of which were duly authenticated.

“ At several periods he took a most important part in public politics, being an active member of a party who pledged themselves to suppress that system of bribery for which the town of Cambridge was long so justly infamous ; and though few of his University and scientific friends sympathised with him on these occasions, his conduct was so typical of his singleness of purpose, firmness of character, and abhorrence of foul play, that this portion of his career cannot be overlooked even in a brief review of his life.

“ On one occasion in particular, when no one else of sufficient position and character would come forward, he had the moral courage to brave, not only the public odium (for which in a just cause he never cared much), but the disapprobation of many of his most intimate friends, and offer himself as the nominal prosecutor in a case of gross corruption. In doing this he was actuated by a feeling of duty to his country, and beyond it he did not interfere ; neither attending the trials or committees, nor subscribing to any of the proceedings. The amount of abuse he received may be estimated by the fact, that upwards of a quarter of a century afterwards he smilingly pointed out to a friend the words ‘ Henslow, common informer,’ on the walls in Cambridge, where they are still legible. His services were, however, deeply appreciated at the time, for he received three handsome testimonials, one from the town of Cambridge, another from the Town Committee for the suppression of corruption, and the third from a committee of noblemen and gentlemen ; all alike testify to the perfect disinterested-

ness, moral courage, and consummate ability with which Professor Henslow conducted the duties he volunteered for. It has been erroneously stated that he received the living of Hitcham as a reward for these services. Such, however, was far from the case; he was made aware, indeed, that he was considered entitled to government patronage, but, with conscientious disinterestedness, he declined to avail himself of the offer. On the death of the previous rector of Hitcham he was recommended by the Bishop of Ely (formerly tutor to Lord Melbourne) as being the man who, in that prelate's opinion, was best calculated by his ability, activity, and common sense, to reform that populous, remote and woefully neglected parish, where the duties of squire, magistrate and rector must all fall upon the latter.

“Amongst the most remarkable instances of a direct benefit conferred upon agriculture through scientific knowledge, was his discovery of the use of the phosphate nodules which abound in the tertiary formations of the Eastern counties. On the discovery of the nature and origin of those petrified animal remains, their value to the farmer was instantly apparent to Professor Henslow, who at once gave his discovery the widest circulation in the local papers, without reservation of any kind; claiming no credit, no reward, no consideration even as the discoverer. This was indeed heaping coals of fire on the farmers' heads, to whom this discovery continues to be a source of incalculable wealth, large areas of Norfolk, Suffolk, and other counties, being now honeycombed with phosphate pits; yet up to the day of Professor Henslow's death, no acknowledgment even was vouchsafed of his services. In the same liberal spirit he printed and circulated his volume of letters to the farmers of Suffolk, which pointed out and stimulated them to use methods which have largely increased the products of their holdings.

“Though the professional career of Professor Henslow as the spiritual guide of his parishioners is a subject unsuited to our columns, yet it is right to state that his duties as pastor superseded all others in his estimation; and though they were eclipsed in public opinion by his more conspicuous labours, and though he had the greatest aversion to a parade of religion, he was ever assiduous in spiritual duties—so much so, that for fifteen years he was not absent from Hitcham for a single Sunday.

“But want of space forbids our going further into the philanthropic or scientific career of this most amiable, learned, and excellent man; a volume might be filled with the incidents of his

ever-busy and well-spent life, during which he was incessantly occupied for others rather than for himself; and with anecdotes of his noble qualities of head and heart. We can only allude to his efforts, not completely successful until near the close of his life, to establish in Cambridge the scientific tripos and degrees in science, and to develop the University Herbarium and Botanical Garden, with their Library and Museum, to which he for 30 years very largely contributed from his private means, and to which he gave all his own botanical collections. To the University his loss is as disastrous as it is irreparable; whether as a member conspicuous for his varied accomplishments and genial nature, or as a teacher, and most especially as not only the best, but the only man altogether qualified to direct the scientific, educational, and practical arrangement of its new museum.

“During the last few years of Professor Henslow’s life his health had become seriously impaired; incessant mental and manual labour, habitually protracted beyond midnight, and the want of proportionate daily exercise, gradually undermined his once robust constitution; though he was always abstemious and temperate in every respect. About five years ago he complained of considerable derangement of lungs or heart, which was attributed by his medical attendants to defective digestion. In March of the present year, though feeling far from well, he left home to pay some visits in the south of England, where he caught a violent cold, which was followed by bronchitis and congestion of the lungs and liver, which alarmingly aggravated his heart symptoms. He returned to Hitcham on the 24th, when he rapidly grew worse, and was soon confined to a bed of protracted suffering, which he never quitted till his death on the 16th of May.

“Professor Henslow desired to be interred in the churchyard at Hitcham, and that his funeral should be of the simplest description, and none but his parishioners employed; his wishes were strictly attended to, but a considerable concourse of strangers found their way to that remote village, and, together with a deputation from the town and corporation of Ipswich, paid their unobtrusive tribute to the memory of one whose rule of life was the motto of his family—‘*Quod videris esto.*’”

*Thomas Hoblyn, Esq., F.R.S. and M.R.I.A.,* was late Chief Clerk in Her Majesty’s Treasury. He died on the 6th of August, 1860, in his 83rd year, having been a Fellow of the Linnean Society since the 4th of March, 1823.

*Edward F. Kelaart, M.D., F.G.S.,* was a native of Ceylon, of what

is there called "burgher" parentage; that is to say, descended from the early Dutch colonists, a race that of late years, under the liberal government of Ceylon, has produced many individuals of merit in the professions of law and medicine. His father was employed in the military medical department, and the son was thence afforded favourable opportunities of acquiring the rudiments of science. In these studies he was much encouraged by the late Henry Marshall, Deputy Inspector-General of Hospitals, and from whose precepts and example he derived the habits of study and arrangement by which he was distinguished. Early in life he visited England to prosecute the study of medicine and surgery, and having obtained his diploma, he was, in 1841, appointed Staff Assistant Surgeon in Her Majesty's Forces. Being stationed in this capacity at Gibraltar, he diligently collected and arranged the plants of that singular promontory. The results of these labours appeared in 1846 under the title of "*Flora Calpensis*, or Contributions to the Botany and Topography of Gibraltar;" a small and unpretending, but highly meritorious and useful work.

Dr. Kelaart subsequently returned to Ceylon, and for several years busied himself with the Fauna of that magnificent island. He also published an extended catalogue of its productions, which forms a valuable addition to the knowledge of its natural history.

His impaired health constrained him on two occasions to return to England, and on his last return to Ceylon in 1856, he was engaged by the late Governor Sir Henry Ward in observing and investigating the Natural History of the Pearl Oyster, the fishery of which is of considerable importance in the revenue of the island. Some of the results of this investigation have appeared in an 'Introductory Report on the Natural History of the Pearl Oyster of Ceylon,' published at Trincomalee in 1857.

He had also previously published at Columbo, in 1852-4, a '*Prodromus Faunæ Zeylanicæ*,' of which he presented the first, and the first part of the second volume, to our Library.

Being subsequently recalled to England, he died suddenly of disease of the heart, during the passage, on the 31st August, 1860, in his 42nd year.

*Frederick Perkins, Esq., F.G.S. & H.S.*, the head of the eminent firm of brewers in Southwark, died on the 10th of October, 1860, in his 81st year, at Chipstead Place, Kent. He was elected a Fellow of the Society on the 13th of March, 1816.

*Francis Plomley, M.D.*, was a physician of considerable repute at Maidstone, where he died, after a long illness, on the 9th of



January, 1860, in the 55th year of his age ; having been a Fellow of the Linnean Society since the 4th of March, 1845.

Dr. Plomley began life as a general practitioner at Lydd, on Romney Marsh, but on his becoming an Extra-Licentiate of the Royal College of Physicians in 1846, he removed to Maidstone. In 1849 he much distinguished himself by his courage and self-devotion in the treatment of a fearful epidemic which broke out among the Irish hop-pickers congregated at East Farleigh, in the neighbourhood of Maidstone. Regardless of danger and fatigue, he devoted himself for sixteen days and nights, almost without intermission, to his painful task, in conjunction with Mr. Sedgwick, Mr. Kennett, the Union Surgeon, and the then Incumbent of the parish, the Rev. Archdeacon Wilberforce. In 1850, Dr. Plomley was appointed Physician to the West Kent Infirmary.

Notwithstanding his professional occupations, he always found time to devote considerable attention to natural history, and especially to ornithology ; and during his residence on Romney Marsh he made a valuable collection of Kentish Birds, comprising not less than 516 specimens, all preserved and set up by himself. This interesting collection, which was always liberally open to the public, he eventually presented to the Dover Museum, where it is shown as the "Plomley Collection." Dr. Plomley's published works are of no great importance, consisting chiefly of lectures addressed to the Weald of Kent Farmers' club in the years 1849-51, on subjects of natural history, interesting to the agriculturist. They are :—

1. A Lecture on the Structure, Functions, and Chemistry of Plants.
2. Observations on the Laws which regulate the Growth and Cultivation of Grain and Root Crops.
3. On the Blights of the British Farm, arising from Parasitic Fungi.
4. On Hop-Blights ; including the Natural History of the Hop-Fly and its Enemies.

These praiseworthy attempts to enlighten his neighbours on scientific subjects very necessary for them to be acquainted with, are all highly creditable to Dr. Plomley, and the last Essay more especially appears to contain some interesting original observations.

*Francis George Probart, M.D.*, was a physician of considerable eminence at Bury St. Edmunds, in which town he had long occupied a very prominent position, and was much and deservedly

respected by all classes. He died suddenly on the 25th of April 1861, aged 79, having been a Fellow of the Linnean Society for 33 years.

*Edward Rigby, M.D.*, one of the most eminent among London obstetrical physicians, was born at Norwich on the 1st of August, 1804, the son of Dr. Edward Rigby, of that town, who attained great celebrity by a valuable "Essay on Uterine Hemorrhage" and other works.

Dr. Rigby was one of twins, and it is a curious circumstance, often adverted to by himself, that he was one of six children born at two births, his mother at a subsequent confinement having produced four.

His education was commenced at the Grammar School of Norwich, then directed by the Rev. Dr. Valpy, and among his school-fellows were Sir James Brooke and Sir Archdale Wilson. He was afterwards placed with the Rev. James Layton, at Catfield in Norfolk, where, however, he did not remain more than two years, and at the age of 17 he attended the practice of the Norfolk and Norwich Hospital, and in the same year had the misfortune to lose his father. He afterwards proceeded to Edinburgh, where he graduated, receiving his diploma on his 21st birthday. Subsequently Dr. Rigby pursued the study of his profession in Dublin, Berlin, and Heidelberg, where, from the kindness of Professor Nægeli, he enjoyed ample opportunities for improving his knowledge of obstetric medicine. Professor Nægeli's instructions and scientific knowledge were so highly valued by his pupil, that Dr. Rigby undertook a translation of the Professor's pamphlet on "The Mechanism of Parturition," which was published in London in 1829.

In the same year he became a house-pupil at the Lying-in Hospital in the York Road, to which Institution he was afterwards first junior and then senior physician. In 1831 he passed the College of Physicians and commenced practice in London, where his professional abilities at once placed him in a prominent position. As a teacher, he began as Lecturer on Midwifery at St. Thomas's Hospital, but in 1838 he was appointed to the Midwifery Chair at St. Bartholomew's, where he continued to lecture for ten years, when the pressure of his professional engagements compelled him to retire. For nineteen years he occupied the position of Examiner in Midwifery in the University of London, vacating it only a few months before his death, which took place on the 27th of December, 1860, as a loving biographer in the 'Medical Times' remarks, "scarcely full of years, but full of honours."

*William Somerville, M.D.*, died on the 25th of June, 1860, at Florence, in his 92nd year, being thus one of two nonagenarians who have departed from among the Fellows of the Linnean Society in the past year.

He was formerly one of the principal Inspectors of the Army Medical Board, and Physician to the Royal Hospital, Chelsea.

*James Forbes Young, M.D.*, was born in April, 1796. He was a magistrate and deputy lieutenant for Surrey, and an eminent medical practitioner in Lambeth, having succeeded his father in practice in the year 1836. His early education was conducted at the Charter House, and he afterwards became a student of medicine at Guy's Hospital, whence he proceeded to Edinburgh, where he graduated in 1817. His unwearied industry and talents, combined with his amicable and conciliatory disposition and deportment, naturally led to a great extension of the practice he had inherited from his father, and justly secured him the love and esteem of all who had occasion to consult him, or came within the sphere of his friendship. Like many others in his profession, he loved natural science, and was distinguished by his ardent zeal in the cultivation of botany and geology. Early in life he began the formation of an *herbarium*, which is said to be rich in British plants collected and arranged by himself. He also devoted much time and attention to, and was very successful in the cultivation of ferns, of which plants he had perhaps one of the choicest collections in the neighbourhood of London. In Geology his attention appears to have been chiefly devoted to the study and collection of chalk fossils, of which he possessed an extensive and fine series. In addition to these professional and scientific pursuits he was no mean antiquarian, and had made a considerable collection of prints relating chiefly either to history or topography, and he had himself profusely illustrated editions of "Grainger's Biographical History of England," "Pennant's London," and the "History of Lambeth and Charter House,"—his own "*alma mater*," besides other works of a more miscellaneous character.

Two years before his death his useful and laborious career was interrupted by an attack of paralysis, from which he never wholly recovered, and, gradually declining, he died on the 30th of June, 1860, and was buried in Lambeth churchyard, which also contains the tombs of the "three Tradescants, grandsire, father and son," restored some years ago under Dr. Young's superintendence.

In our list of FOREIGN MEMBERS we have to lament the loss of one of the oldest and most famous of European Zoologists, the

venerated M. Duméril, who died on the 14th of August, 1860, after a short illness, at the advanced age of 86, universally honoured and beloved.

*Andre-Marie-Constant Duméril, Member of the Institute and Commander in the Legion of Honour*, was born at Amiens in the year 1774. At an early age he devoted himself to the study of Medicine, and so soon distinguished himself, that in 1793, when only 19, he was appointed Prévôt d'Anatomie at Rouen. In 1798 he was admitted to the degree of Doctor of Medicine in the University of Paris, and was nominated Chef des Travaux Anatomiques in that Capital, an office for which he had competed successfully with Dupuytren. In 1801 he was raised to the chair of Anatomy at the Faculty of Medicine, which in 1822 he resigned for that of Physiology, to be in turn exchanged, in 1830, for that of internal Pathology, which he held till his death. In the early part of his career he appears to have been also actively engaged in the practice of Medicine, and in 1804 was appointed by the Emperor Napoleon, in company with M. Desgenettes, on a mission to study the yellow fever in the South of Spain,—a dangerous duty, to which he devoted himself with the zeal and energy which he displayed on all occasions and on all subjects.

But notwithstanding these professional occupations, M. Duméril's attention was from the first principally directed towards zoological science, to various departments of which his chief works alone belong.

In 1800, under the direction of Cuvier, he assisted in the editing of the first two volumes of the '*Leçons d'Anatomie Comparée*' of that great anatomist, who never failed on all occasions to acknowledge the assistance he had derived from his able and industrious coadjutor; by whom also he was succeeded in the chair of Natural History in the École Centrale of the Panthéon\*.

In 1802 he was deputed by M. de Lacépède to deliver the lectures on Herpetology and Ichthyology at the Jardin des Plantes, a mission which M. Duméril continued to fulfil for more than fifty years, at first as the substitute for M. de Lacépède, and afterwards as titular Professor of those subjects. To his zeal and industry in this office, not only is the Museum indebted for the creation both of the best collection of objects belonging to Herpetology

\* In a notice of M. Duméril's works, it should not be omitted that he was perhaps the first to perceive the analogy of structure which exists between the vertebræ and the bones of the cranium; a theory which for the last forty years has exercised the ingenuity of so many.

ever brought together, and of living specimens in the Menagerie of Reptiles, but the scientific world at large owes the production of the great work on Herpetology, the 'General History of Reptilia,' which, at first in conjunction with his friend and pupil the late lamented M. Bibron, was in progress for a period of twenty years.

The scientific labours of M. Duméril, continued through an almost unparalleled length of years with unabated vigour and success, have crowned his name with universal fame, and his deserts have been acknowledged in the various honours bestowed upon him. In 1816 he was chosen a member of the Academy of Sciences (Section of Anatomy) in place of M. Tenon, and received the decoration of the Legion of Honour in 1837, in which illustrious Corps he was raised to the rank of Commander a short time before his death. His honoured name was added to the list of our Foreign Members in 1854.

In his zoological works he displayed great descriptive and analytic powers, delighting in precise and lucid definitions, and in attention to systematic classification. At the same time, however, like Buffon and Pallas, Reaumur and De Geer, and many others of the most illustrious zoologists, he devoted much time to the study of the habits of animals, the record of which adds so much not only to the scientific value, but to the popularity and interest of zoological works. The subjoined list of M. Duméril's principal works, though I fear very imperfect, will still serve, better than anything else, to show how his valuable labours were continued and varied during a longer life than falls to the lot of most, and continued moreover, it may be said, with increasing value and importance to the last. His first work left the press in 1797, when he was but 23; and his last, a quarto of 1336 pages, appeared almost simultaneously with his decease at the patriarchal age of 86.

Few can show such a career of usefulness, and of no one can it be more truly said that in its course he never made an enemy. Distinguished as M. Duméril was in science, in moral worth he was equally eminent. Devoted in friendship, amiable towards his colleagues, paternal towards his pupils, benevolent towards all men, void of jealousy or envy towards rivals,—his praise was always ready where it could be bestowed, and his encouragement wherever it was needed.

The following are the principal works for which science is indebted to M. Duméril:—

1. Dissertation sur l'Organe de l'Odorat, et sur son existence. dans les Insectes. 1797.

2. *Traité élémentaire de l'Histoire naturelle.* 1804; 2nd ed. 1830.

3. *Zoologie Analytique, ou Méthode naturelle de Classification des Animaux.* 1806.

4. *Mémoires de Zoologie et d'Anatomie Comparée.* 1807.

5. *Sur le developpement de la Chaleur dans les œufs des Serpens* (Mém. de l'Acad.).

6. *Dissertation sur les Poissons qui se rapprochent le plus des Animaux sans Vertèbres.* 1812.

7. *Dissertation sur la Famille des Poissons Cyclostomes, pour démontrer leurs rapports avec les Animaux sans Vertèbres.* 1812.

8. *Considérations générales sur la Classe des Insectes.* 1823.

9. *Erpétologie générale, ou Histoire naturelle des Reptiles.* 1834-54 (in conjunction with his friend and disciple, M. Bibron).

10. *Prodrome de la Classification des Reptiles Ophidiens.* 1853.

11. *Ichthyologie Analytique; ou Essai d'une Classification naturelle des Poissons.* 1856.

12. *Entomologie Analytique.* 1860.

The Secretary also announced that twenty-three Fellows, one Foreign Member, and one Associate, had been elected since the last Anniversary.

At the Election which subsequently took place, George Bentham, Esq., was elected President, W. W. Saunders, Esq., Treasurer; and George Busk, Esq. and Frederick Currey, Esq., Secretaries. The following five Fellows were elected into the Council, in the room of others going out:—viz., M. P. Edgeworth, Esq., John Miers, Esq., Daniel Oliver, Esq., Lovell Reeve, Esq., and P. L. Sclater, Esq.

It was moved by Dr. Boott, and seconded by Mr. Saunders, that the best thanks of the Society be given to Professor Bell, for his invaluable services to the Society during the eight years he has occupied the President's chair. That the Society gratefully acknowledges the unvarying courtesy and kindness with which he has discharged the duties of the office, and fully recognizes the zealous interest he has taken in the welfare of the Society and in the promotion of its objects; willingly attributing to his efforts much of its present prosperity and increased usefulness, as displayed in the large number of new Fellows, the value and greater frequency of its publications, and the satisfactory state of its finances.

It was moved by Mr. Bentham, and seconded by Mr. Saunders, that the thanks of the Society be given to Dr. Boott, on his retirement from the office of Treasurer, with an expression of the Society's deep regret on losing his valuable services in that capacity.

Mr. Bennett, on the part of the auditors of the Treasurer's accounts, read the balance sheet, by which it appeared that the total receipts during the past year, including a balance of £415 14s. 3*d.* carried from the preceding year, amounted to £1,566 13s. 1*d.*; and that the total expenditure during the same period amounted to £1,121 10s. 8*d.*; leaving a balance in the hands of the bankers of £445 2s. 5*d.*

June 6th, 1861.

George Bentham, Esq., President, in the Chair.

The President nominated Thomas Bell, Esq., J. J. Bennett, Esq., J. D. Hooker, Esq., M.D., and W. W. Saunders, Esq., Vice-Presidents for the ensuing year.

Read, first, "Notes on *Caryophylleæ*, *Portulacææ*, and some allied Orders;" by George Bentham, Esq., Pres. L.S. (See "Botanical Proceedings," vol. vi.)

Read, secondly, "Further Remarks on Scansile Appendages to the Feet of Insects;" by Tuffen West, Esq., F.L.S. (See "Transactions," vol. xxiii., Part 2.)

Read, thirdly, "Catalogue of *Hymenopterous Insects* collected by A. R. Wallace, Esq., in Ceram, Celebes, Ternate, and Gilolo;" by Frederick Smith, Esq., Assistant in the Zoological Department, British Museum. Communicated by W. W. Saunders, Esq., V.P.L.S. (See "Zoological Proceedings," vol. vi.)

June 20th, 1861.

George Bentham, Esq., President, in the Chair.

Senjee Pulney Andy, Esq., M.D., John Thomas Head Cotsell, Esq., and Peter Jones, Esq., were elected Fellows.

Professor Huxley, F.R. & L.S. exhibited a specimen of *Hyalomema mirabilis*, the property of Mr. Veitch (to whom it had been sent by his son from Japan), and made some explanatory observations.

General Sir John Hearsey, C.B., F.L.S., exhibited a collection of new or rare insects made by himself in India: also drawings illustrative of the transformations of Indian insects.

Sir Charles Bunbury, Bart., F.L.S., exhibited a flowering specimen of *Æsculus indica*, from Barton Hall, Suffolk. The tree raised from seed in 1851.

Dr. Carpenter, F.R. & L.S., exhibited the cocoons of the Tusseh Silk-moth of the Deccan (*Saturnia Mytilla*), from which silk is extensively manufactured at Wurrungul, in the Nizam's dominions.

Read, first, "Notes on *Malvaceæ* and *Sterculiaceæ*;" by George Bentham, Esq., Pres. L.S. (See "Botanical Proceedings," vol. vi.)

Read, secondly, "On *Fissicalyx* and *Prioria*, two recently published genera of *Leguminosæ*;" by the same. (See "Transactions," vol. xxiii. Part 2.)

Read, thirdly, "On the Discovery of *Carex Ericetorum*, Poll., as a native of Britain;" by C. C. Babington, Esq., M.A., F.R.S. & L.S., Prof. Bot. Univ. Camb. (See "Botanical Proceedings," vol. vi.)

Read, fourthly, "On three Oaks from Palestine;" by J. D. Hooker, Esq., M.D., F.R.S. & L.S. (See "Transactions," vol. xxiii. Part 2.)



Read, fifthly, "On some species of Oak from North China, collected by W. F. Daniell, Esq., M.D., F.L.S.;" by William Carruthers, Esq., F.L.S. (See "Botanical Proceedings," vol. vi.)

Read, sixthly, "Upon the Nerve proceeding to the Vesicles at the base of the Halteres; and on the subcostal Nervure on the Wings of Insects;" by J. B. Hicks, Esq., M.D., F.L.S. (See "Transactions," vol. xxiii. Part 2.)

*Receipts and Payments of the Linnean Society from May 1, 1860, to April 30, 1861.*

|                                                                                    | £            | s.        | d.       |
|------------------------------------------------------------------------------------|--------------|-----------|----------|
| Balance in the hands of the Bankers at last audit .....                            | 415          | 14        | 3        |
| Admission Fees .....                                                               | 120          | 0         | 0        |
| Compositions .....                                                                 | 330          | 0         | 0        |
| Annual Contributions of £2 2s. ....                                                | 54           | 12        | 0        |
| Do. do. of £3 .....                                                                | 519          | 0         | 0        |
| Penalty of Bond (J. F. South, Esq.) .....                                          | 20           | 0         | 0        |
| Transactions and Journal sold .....                                                | 85           | 11        | 1        |
| Dividends on Consols .....                                                         | 8            | 12        | 6        |
| Contribution to Removal Fund .....                                                 | 5            | 0         | 0        |
| Donation from Daniel Hanbury, Esq. (Cost of plate in<br>Linnean Transactions)..... | 8            | 3         | 3        |
|                                                                                    | <u>£1566</u> | <u>13</u> | <u>1</u> |

|                                           | £            | s.        | d.       |
|-------------------------------------------|--------------|-----------|----------|
| Insurance .....                           | 15           | 2         | 0        |
| Repairs and Furniture .....               | 11           | 11        | 0        |
| Coals, Gas, Tea, Postage, &c. ....        | 96           | 10        | 9        |
| Salaries .....                            | 170          | 0         | 0        |
| Printing, Engraving, &c. ....             | 655          | 1         | 0        |
| Books purchased.....                      | 26           | 2         | 4        |
| Bookbinding and Stationery .....          | 27           | 3         | 10       |
| Bond paid off, with Interest .....        | 108          | 0         | 0        |
| Commission.....                           | 11           | 19        | 9        |
| Balance in the hands of the Bankers ..... | 445          | 2         | 5        |
|                                           | <u>£1566</u> | <u>13</u> | <u>1</u> |

F. BOOTT, *Treasurer.*

The foregoing Accounts have been examined, and the Balance in hand found to be correctly stated at £445 2s. 5d.

May 20, 1861.

THOMAS BELL, *President.*  
JOHN J. BENNETT, V.P.  
JOHN HOGG.

W. WILSON SAUNDERS, V.P.  
J. S. BOWERBANK.  
GEORGE BUSK.

PROCEEDINGS  
OF THE  
LINNEAN SOCIETY OF LONDON.

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November 7th, 1861.

George Bentham, Esq., President, in the Chair.

Samuel Ainsworth, Esq., was elected a Fellow.

A Marble Bust of the late Robert Brown, Esq., Pres. L.S., by Mr. Slater, was presented by the President, on the part of the following Members; to whom the special Thanks of the Society were directed to be offered for this very acceptable Donation:—

|                                  |                              |
|----------------------------------|------------------------------|
| W. Addison, M.D.                 | George Busk, Esq., Sec. L.S. |
| C. C. Babington, Esq.            | W. B. Carpenter, M.D.        |
| Rev. C. Babington.               | Henry Christy, Esq.          |
| Thomas Bell, Esq., V.P.          | Charles Cogswell, M.D.       |
| George Bennett, M.D.             | Hugh Cuming, Esq.            |
| J. J. Bennett, Esq., V.P.        | C. G. B. Daubeny, M.D.       |
| George Bentham, Esq., Pres. L.S. | M. Pakenham Edgeworth, Esq.  |
| H. G. Bohn, Esq.                 | Hugh Falconer, M.D.          |
| Francis Boott, M.D.              | W. H. Fitton, M.D.           |
| J. S. Bowerbank, Esq.            | John Forster, Esq.           |
| G. B. Buckton, Esq.              | R. E. Grant, M.D.            |
| W. M. Buckton, Esq.              | Daniel Hanbury, Esq.         |

J. A. Hankey, Esq.  
 Sir J. B. Hearsey, K.C.B.  
 Rev. J. S. Henslow.  
 Sir W. J. Hooker.  
 J. D. Hooker, M.D., V.P.  
 Robert Hudson, Esq.  
 T. C. Janson, Esq.  
 R. Kippist, Libr. L. S.  
 J. S. Law, Esq.  
 John Lubbock, Esq.  
 George MacLeay, Esq.  
 T. W. Mann, Esq.  
 John Miers, Esq.

Joseph Milligan, Esq.  
 T. N. R. Morson, Esq.  
 Sir R. I. Murchison.  
 Algernon Peckover, Esq.  
 Charles Ratcliff, Esq.  
 F. C. S. Roper, Esq.  
 S. J. A. Salter, Esq.  
 W. W. Saunders, Esq., V.P.  
 Thomas Thomson, M.D.  
 John Van Voorst, Esq.  
 G. C. Wallich, M.D.  
 Alfred White, Esq.  
 Joseph Woods, Esq.

The special Thanks of the Society were likewise directed to be given to Major Salmon, Executor of the late J. D. Salmon, Esq., F.L.S., in return for the bequest, by his late brother, of a valuable collection of birds' eggs, dried plants, numerous works on natural history, &c.

Mr. Stevens, F.L.S., exhibited specimens of 25 species of Birds, collected by Mr. A. R. Wallace, at Waigiou and Mysol, near New Guinea.

The Secretary read a Letter from R. B. Cooke, Esq., F.L.S., &c., dated "Scarborough, June 20th, 1861," and announcing the discovery of *Maianthemum bifolium* on the range of hills opposite Harkness, about  $4\frac{1}{2}$  miles from Scarborough, where this rare and beautiful plant grows in the woods, among luxuriant specimens of *Trientalis europæa*.

The following Papers were read :—

1. "On West-African Tropical Orchids;" by John Lindley, Esq., Ph.D., F.R.S., L.S., &c. (See 'Botanical Proceedings,' vol. vi.)

2. "Note on the Structure of the Anther;" by Daniel Oliver, Esq., F.L.S., Prof. Bot. Univ. Coll. Lond. (See 'Transactions,' vol. xxiii. part 3.)

3. "Notes on *Coutoubea volubilis*, Mart., and some other *Gentianeæ* of Tropical America;" by Dr. R. H. Grisebach, F.M.L.S. (See 'Botanical Proceedings,' vol. vi.)

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November 21st, 1861.

George Bentham, Esq., President, in the Chair.

Edward Clapton, M.D., was elected a Fellow.

Mr. Hanbury, F.L.S., exhibited specimens of the resinous wood of *Aquilaria Agallocha*, Roxb., a substance interesting as being the *Aloes* or *Lign. Aloes* of the Bible; and made some observations upon its production in Sylhet, Assam, and Cochin China.

Dr. Cobbold, F.L.S., made some observations, illustrated by sketches, on the mode of reproduction of *Gyrodactylus elegans*, a parasite upon the common Stickleback, and found abundantly by him in the Serpentine.

The following Papers were read, viz. :—

1. "On the Two Forms, or Dimorphic Condition, in the Species of *Primula*; and on their remarkable Sexual Relations;" by Charles Darwin, Esq., M.A., F.R.S., L.S., &c. (See 'Botanical Proceedings,' vol. vi.)

2. "Contributions to an Insect-Fauna of the Amazon Valley.—*Lepidoptera Heliconina*;" by Henry Walter Bates, Esq. Communicated by the Secretary. (See Abstract in 'Zoological Proceedings,' vol. vi.)

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December 5th, 1861.

George Bentham, Esq., President, in the Chair.

Francis Ablett Jesse, Esq., and Charles John Leaf, Esq., were elected Fellows.

The President announced to the Society the following Resolution of the Council, agreed to at a Meeting held this day :—

“Resolved, that in conformity with chapter 2, section 6, and with chapter 7, section 2, of the Bye-laws, the name of Mr. Nathaniel Haslope Mason, who has failed to pay his arrears of annual contributions, and neglected repeated applications made to him for payment, be proposed to the General Meeting, to be held this day, for Ejection from the Society.”

The President then proposed the Ejection of Mr. N. H. Mason, and announced that the ballot upon the question would be taken at the next Meeting, on the 19th instant.

The following Papers were read :—

1. “On a new Genus of *Tunicata*, occurring on one of the Bel-lona Reefs;” by John D. Macdonald, Esq., R.N., F.R.S. Communicated by the Secretary. (See ‘Zoological Proceedings,’ vol. vi.)
2. “Note on the Occurrence of the Crustacean, *Scyllarus Arctus*, in England;” by Jonathan Couch, Esq., F.L.S. (See ‘Zoological Proceedings,’ vol. vi.)
3. “A Note on the Formation of Pearls;” by Robert Garner, Esq., F.L.S. In this communication the author stated that, in his microscopical examination of pearls from mussels taken at the mouth of the Conway, he was led to attribute their formation to the deposit in the mantle of the exuviae or secretions of a small species of *Distoma*.

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December 19th, 1861.

The Meeting appointed to be held this day was postponed, by direction of the President, in consequence of the death of His Royal Highness The Prince Consort.

January 16th, 1862.

George Bentham, Esq., President, in the Chair.

William Chapman Hewitson, Esq., was elected a Fellow.

Nathaniel Haslope Mason, Esq., who was proposed for Ejection on the 5th of December, was balloted for and ejected, in conformity with the Bye-laws, chapter 7, section 2; and the President, in conformity with the same section of the Bye-laws, cancelled his name in the Register, and pronounced him to be no longer a Fellow of the Society.

The President announced that, at the Meeting of Council on the 9th instant, an Address of Condolence to Her Majesty on the Death of His Royal Highness The Prince Consort was agreed upon, and had since been sent accordingly to Sir George Grey: which Address was read to the Meeting, as follows:—

“To the Queen’s Most Excellent Majesty.

“Madam,

“We, Your Majesty’s loyal and devoted subjects, the President and Council of the Linnean Society of London, in view of the great and calamitous bereavement which has befallen Your Majesty, and which has plunged the nation in one common grief, cannot refrain from offering to Your Majesty the heartfelt tribute of our sympathy and condolence. The noble qualities both of head and heart with which The Prince Consort was endowed, his extensive and varied acquirements, his sound judgment, the eminently practical character of his views, the excellence of his disposition, and the warm cordiality with which his enlightened mind applied itself to the support of every useful object and the promotion of every good work, had obtained for him so firm a hold on the public mind and affection, that his loss to the nation can be regarded as secondary only to that which Your Majesty has sustained.

“By us, especially, as one of the Scientific Institutions of the land amongst whose members His Royal Highness was pleased to allow his name to be enrolled, his loss will be doubly and deeply felt, on account of the warm interest which, both by inclination and by study, he was ever ready to take in everything affecting the interests of science.

“Laying before Your Majesty this our humble tribute of condolence, we fervently pray that the Divine Disposer of Events

will be graciously pleased so to temper the severity of this great calamity, that Your Majesty may be enabled to find the truest consolation under affliction, and the best support in its endurance, in the exercise of the privileges and the duties of your high station, and in the continuance of that parental and superintending care, which is so well calculated to render Your Majesty's Royal House a blessing to the nation, and an example to the other kingdoms of the earth."

"For the President and Council of the Linnean Society,  
(Signed) "GEORGE BENTHAM, President."

Mr. Bates exhibited specimens of Lepidopterous Insects, in illustration of his Paper "On the Insect-Fauna of the Amazon Valley," read on the 21st of November, 1861.

The President read a Letter addressed to himself by Clement R. Markham, Esq., of the India Office, forwarding for presentation to the Society four pamphlets, printed for the use of those entrusted with the cultivation of *Cinchonæ* in India and Ceylon:—viz. 1. Report on the Cultivation of the Quina-tree in Java (translated from the '*Bonplandia*'): 2. Translations of Dr. Karsten's work on New Granada Barks, and Poeppig's on those of Huanuco: 3. Botanical descriptions of the species of *Cinchona* now growing in India and Ceylon; from the works of Weddell, Howard, &c.: 4. Mr. Spruce's Report on the 'Red Bark' region; and requesting that the President would mention to the Society how successful the introduction of the *Cinchona*-trees into the Neilgherry Hills has hitherto been.

"My last accounts," he says, "are dated November 30th, when the plants were in very fine condition; many of them in the most luxuriant state of health. Average growth of the month  $2\frac{1}{2}$  inches; largest of the plants 3 feet 9 inches high.

"The number of plants was as follows:—

|                            |              |
|----------------------------|--------------|
| <i>C. succirubra</i> ..... | 4762         |
| <i>C. Calisaya</i> .....   | 6            |
| <i>C. nitida</i> .....     | 917          |
| <i>C. micrantha</i> .....  | 1228         |
| <i>C. Peruviana</i> .....  | 64           |
| <i>C. Pahudiana</i> .....  | 175          |
| Species without name ..... | 314          |
| Total.....                 | 7466 plants. |



“Moreover, a new propagating-house has just been completed, and 25 acres of forest land have already been cleared for the Cinchona plantations. A very large supply of seeds of the *C. Condaminea*, from Loxa, was sent off to India and Ceylon this day. The great planting-out of Cinchonas in the Neilgherries will commence next spring.”

Dr. Hooker, V.P.L.S., gave an account of *Welwitschia mirabilis*, illustrated by drawings, specimens, and sections. This most extraordinary plant was detected in 1859 by Dr. Frederick Welwitsch near Cape Negro, in Western Africa, and described by him (under the provisional name of “*Tumboa*”) in the last volume of the Society’s ‘Journal’ (*Botany*, p. 185–6). The specimens were kindly sent for exhibition by Sir W. J. Hooker, K.H., F.R.S. & L.S., by whom they had been recently received from the discoverer.

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February 6th, 1862.

George Bentham, Esq., President, in the Chair.

William Ferguson, Esq., John Daniel Moore, M.D., Henry Scott, M.D., Charles Tyler, Esq., and James Veitch, Jun., Esq., were elected Fellows.

The following Papers were read:—

1. “Notes on the Anatomy of the *Smynthuridæ*,” by John Lubbock, Esq., F.R.S. & L.S.

Very different opinions have been held by various naturalists as to the true affinities of the *Thysanoura*, and the position which they ought to hold among the *Articulata*. Other aberrant groups, however, have been considered worthy of special study; but, in the present instance this has not been the case, and the *Thysanoura* have been much neglected. The beauty of their colours, the elegance of their forms, and the frequency of their occurrence have all been unable to tempt our entomologists to the pursuit of animals which cannot be pinned, and are moreover more than suspected of having passed the fatal Rubicon of entomology.

The *Thysanoura* consist of two great groups, the *Lepismidæ*

and *Poduridæ*. M. Nicolet has already divided the latter into three groups,—the *Podurelles*, containing the elongated forms; the *Smynthurelles*, which correspond to the old genus *Smynthurus*; and the *Lipurelles*, for the non-saltatorial species. These three groups Mr. Lubbock considers as three families, and it is to the second of the three that his present observations are confined. To the two genera of which it has hitherto consisted he adds a third, characterized by having the antennæ four-jointed, without an elbow, and with a short terminal segment. The organs of respiration also are very different. Of this genus he describes two new species, as well as one of *Smynthurus*.

Without going through the various opinions which have been held as to the composition of the mouth in the *Poduridæ*, it may be sufficient to mention that M. Nicolet, whose views have generally been followed by succeeding writers, describes, first, a labrum; secondly, mandibles; thirdly, maxillæ; fourthly, a labium. He found no palpi. Mr. Lubbock, however, describes a pair of small palpi, and also a pair of membranous organs which represent perhaps the second pair of maxillæ. There is, moreover, another membranous body in front of the labium, which is equivalent, probably, to the *langue vésiculeuse* of the *Lepismidæ*. If this is to be considered as representing another pair of appendages, it is evident that the mouth of the *Thysanoura* presents several interesting peculiarities in which it differs from that of other hexapod Articulata and makes an approach to other groups of the great Annulose series. Mr. Lubbock, however, hesitates to draw the conclusions which seem to him to follow from these facts, until he shall have been able to study the construction of the mouth in other allied families.

The digestive organs consist of a narrow œsophagus, a capacious stomach, and a short rectum. The generative organs of the female consist of two egg-tubes, one on each side, communicating by a rather long vagina with the vulva, which opens with the anus at the posterior end of the body. The testes are formed on the same type as the ovary; at their posterior extremity they expand into a somewhat triangular "receptacle," two sides of which are accompanied by a glandular organ, the cavity of which is filled with minute granules. From each receptacle a short, narrow vas deferens leads into a somewhat pear-shaped ductus ejaculatorius, which opens in a papilla immediately in front of the anus. There appears to be no penis.

In *Smynthurus* the spiracles are two in number, and open on

the under side of the head—a most unusual position, and one for which we can as yet find a parallel only among the *Arachnida*; *Trombidium holosericeum* having the spiracles, according to Pagenstecher, at the base of the mandibles. In several other genera of *Thysanoura*, and even in the new genus of *Smynthuridæ* now described, Mr. Lubbock has found no tracheæ, and believes that respiration is principally effected through the general surface of the skin.

How different this account of the internal anatomy is from that given by M. Nicolet, a glance at his figures will show. In the digestive organs he describes and figures, first, *l'ésophage*; secondly, *jabot*; thirdly, *ventricule chylifère*; fourthly, *vaisseaux hépatiques*; fifthly, *intestin grêle*; sixthly, *cæcum* (the last no doubt a slip of the pen for rectum). In the respiratory system he finds eight spiracles on the dorsal surface of the first four abdominal segments, and an elegant network of tracheæ. Mr. Lubbock has not indeed as yet met with *Podura similata*—the species which M. Nicolet dissected; but that author appears to extend his descriptions to the whole group, and has been so understood by subsequent writers. Even if his descriptions are correct for the species with which he worked, they cannot be applied to the other genera; and the statements made in general works on comparative anatomy must therefore be considered as altogether erroneous.

The so-called “gastric tube,” and the two tentacles which proceed from it, are not the least curious part of the anatomy of *Smynthurus*. The tube itself is situated between the posterior legs; and the two colourless, semitransparent tentacles which can be projected from it are about  $\frac{1}{10}$ th of an inch in length, and covered with gland-like papillæ. When creeping on a slippery surface the animal uses these tentacles to ensure its hold, or if turned over on its back, avails itself of their assistance to regain its normal position. Each tentacle contains two muscles, one of which is attached at the extremity, and the other at a point about halfway. These two muscles are, at their other end, attached to the back, close together. We might at first be inclined to wonder at the presence of two muscles, and to suppose that the object might have been equally well attained by a single one. The two, however, acting on different parts, may enable the organ to be retracted more quickly than might otherwise be the case—an advantage doubtless of much importance in a structure so delicate. Again, it is evident that a single muscle attached to the end could

not have fully retracted the tentacle, because the distance between the point of attachment of the muscle and the ventral tube is less than the length of the tentacle; but this difficulty is at once avoided by the presence of a second muscle, which throws the retracted tentacle into a curve. Moreover, the muscles are already greatly extended when the tentacle is protruded to its full length, but must have been much more so if there had only been a single muscle. (See 'Transactions,' vol. xxiii. Part 3.)

2. "On the Geographical Relations of the *Coleoptera* of Old Calabar;" by Andrew Murray, Esq., F.L.S., Assist. Sec. R. Hort. Soc. (See 'Transactions,' vol. xxiii. Part 3.)

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February 20th, 1862.

George Bentham, Esq., President, in the Chair.

Thomas Glazebrook Rylands, Esq., was elected a Fellow.

The following Papers were read, viz.:—

1. "On Prolification in Flowers, and especially on that kind termed 'Axillary Prolification,'" by Maxwell T. Masters, Esq., F.L.S. (See 'Transactions,' vol. xxiii. Part 3.)

2. "On *Inocarpus*;" by George Bentham, Esq., Pres. L.S. (See 'Botanical Proceedings,' vol. vi.)

3. "Note on *Hamamelis* and *Loropetalum*; with a description of a new *Anisophyllea*;" by Daniel Oliver, Esq., F.L.S., Prof. Bot. Univ. Coll. Lond. (See 'Transactions,' vol. xxiii. Part 3.)

4. "Notice of a Collection of *Algæ*, made on the North-west Coast of North America, chiefly at Vancouver's Island, by David Lyall, M.D., in 1859-61;" by W. H. Harvey, M.D., F.R.S & L.S., Prof. Bot. Univ. Dublin. (See 'Botanical Proceedings,' vol. vi.)

March 6th, 1862.

George Bentham, Esq., President, in the Chair.

Albany Hancock, Esq., Thomas Hyde Hills, Esq., and Robert McLachlan, Esq., were elected Fellows.

Dr. Cobbold, F.L.S., communicated the substance of a Paper, entitled, "Histological Observations on the Eye of the Cod-fish (*Morrhua vulgaris*), with especial reference to the Choroid Gland and the Cones of the Retina." (See 'Zoological Proceedings,' vol. vi.)

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March 20th, 1862.

George Bentham, Esq., President, in the Chair.

The Right Hon. Lord Lilford, W. H. Flower, Esq., St. George Jackson Mivart, Esq., and Benjamin Leadbeater, Esq., were elected Fellows.

Read, 1st, the following Letter from Professor Babington, F.R.S. & L.S., accompanying specimens of *Isoëtes echinospora*, Durieu, from the neighbourhood of Llanberis, for the Society's British Herbarium :—

" *To the Secretary of the Linnean Society of London.*

" Cambridge, 22nd February, 1862.

" MY DEAR SIR,—Will you have the kindness to place before the Linnean Society, and afterwards deposit in the British Herbarium, the enclosed specimen of *Isoëtes echinospora*, Dur., named by him. I am not able to state the exact spot near Llanberis (Caernarvonshire) where I gathered the plant in 1847, but believe it to have been in the Lower Lake. I am sorry that the specimen is not finer; but all the specimens that I have seen are smaller than those of *I. lacustris*, and the best that I possessed were sent to France.

" Mr. W. Wilson, the celebrated muscologist, has furnished M. Durieu and myself with a specimen between us of the same species,

gathered by him in a pool near Llyn y Cwn, Caernarvonshire, on June 30, 1828; and Dr. Dickie has sent one, for similar division, from Loch of Park, near Aberdeen, where it was gathered by Mr. Sutherland.

"I do not enter upon a discussion of the characters of these plants, because Messrs. Durieu de Maisonneuve and Gay will publish a paper upon them and other species of *Isoëtes* at an early date. It may, nevertheless, be well to mention that Mr. Gay gives the characters to me as follows:—

"*I. lacustris* (L.) ; folia stricta atro-viridia ; macrosporæ superficiei obtuse tuberculatæ quasi farinaceæ.

"*I. echinospora* (Dur.) ; folia molliora patentissima læte viridia, senescentia e viridi-flava, macrosporæ acutiuscule tuberculatæ, quasi echinatulæ."

"The 'Bull. Soc. Bot. de Fr.' viii. 164 is the place where a distinctive name and character were given to the plant.

"Yours very truly,

"C. C. BABINGTON."

2. "Observations on some Skulls from Ceylon, said to be those of Veddahs;" by George Busk, Esq., F.R.S., Sec. L.S. (See 'Zoological Proceedings,' vol. vi.)

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April 3rd, 1862.

George Bentham, Esq., President, in the Chair.

Percival Forster, Esq., Septimus Holmes Godson, Esq., and James Thomson, Esq., were elected Fellows.

Dr. Cogswell, F.L.S., exhibited a fine specimen of gold-bearing quartz, from the neighbourhood of Halifax, Nova Scotia; and Prof. Tennant exhibited, on the part of the Government of Nova Scotia, a valuable series of ores and specimens of gold from that Province, and made some observations upon them.

The following Papers were read:—

1. "On the three remarkable Sexual Forms of *Catasetum tridentatum*, an Orchid in the possession of the Linnean Society;" by Charles Darwin, Esq., F.R.S., F.L.S., &c. (See 'Botanical Proceedings,' vol. vi.)

2. "On the discovery of *Gladiolus illyricus*, Koch, in the Isle of Wight," by A. G. More, Esq., F.L.S. (See 'Botanical Proceedings,' vol. vi.)

Dr. Macdonald, F.L.S., afterwards communicated, orally, the substance of a Paper "On the Classification of the Warm-blooded *Vertebralia*, and their Parallelism."

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April 17th, 1862.

George Bentham, Esq., President, in the Chair.

The following Papers were read:—

1. "Notes on the Exogenous Flora of the Anamallay Mountains, in South India, with descriptions of New Species, and a Catalogue of the Ferns;" by Capt. R. H. Beddome, Assistant Conservator of Forests. Communicated by Thomas Thomson, M.D., F.R.S. & L.S.

2. "On African *Anonaceæ*;" by George Bentham, Esq., Pres. L.S. (See 'Transactions,' vol. xxiii. Part 3.)

3. "On the Structure of the Mantle in *Testacella*;" by Lovell Reeve, Esq., F.L.S. (See 'Zoological Proceedings,' vol. vi.)

4. "On the Spiral Markings of the Flocci in the genus *Trichia*;" by the Rev. M. J. Berkeley, M.A., F.L.S.

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May 1st, 1862.

George Bentham, Esq., President, in the Chair.

Edward Romilly, Esq., was elected a Fellow; Dr. D. F. Eschricht, Dr. H. Lacaze-Duthiers, and Dr. Hermann Schlegel, Foreign Members; and Mr. Edward Gerrard, an Associate.

The Special Thanks of the Society were directed to be given to Lady Smith, in return for the following Donations, viz.:—1. A

presentation copy to Linnæus of Lord Baltimore's 'Gaudia Poetica;' 2. 'Memoirs relating to European and Asiatic Turkey,' and 'Travels in various Countries of the East,' edited by the Rev. R. Walpole; the latter work containing copious extracts from the Journals of the late Dr. Sibthorp.

The following Papers were read, viz. :—

1. "On the abnormal Habits of some Females of the genus *Orgyia*;" by H. T. Stainton, Esq., F.L.S. (See 'Zoological Proceedings,' vol. vi.)

2. "Florula Mallica;" by M. P. Edgeworth, Esq., F.L.S. (See 'Botanical Proceedings,' vol. vi.)

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May 24th, 1862.

*Anniversary Meeting.*

George Bentham, Esq., President, in the Chair.

This day, the Anniversary of the Birth of Linnæus, and the day appointed by the Charter for the Election of Council and Officers, the President opened the business of the Meeting with the following Address :—

GENTLEMEN,

IN addressing you for the first time from this Chair on the occasion of your annual gathering, I have to thank you for that kind support and assistance which enables me to congratulate you on a continuance of the state of prosperity to which the Society had been brought under the zealous superintendence of my predecessor. Before leaving the Chair, he had the satisfaction of announcing to you that the debt which had been so long hanging over us in consequence of the purchase of the Linnean Collections had been at last cleared off, and that a commencement had been made of permanent investments. He also expressed his opinion that in future the whole amount of life-compositions received from new Fellows should be added to these investments. We have accordingly, as a step towards this desideratum, purchased, out of the present year's balance, additional stock to the



amount of £300; and although I should be of opinion that a portion of the sums received from Life Members should be added to those contributed by our other Fellows in order to meet our legitimate amount of expenditure, yet I trust we shall continue in each year to add to our permanent capital, or lay out in additions to our library or other valuable property an amount nearly equivalent to these compositions, leaving a sufficient annual income to increase rather than diminish the extent of our publications.

But if I thus dwell with complacency on the prosperous state of our financial affairs, compared especially with what they were when Mr. Bell first took the Chair in 1853, let it not be supposed that I should willingly acquiesce in any relaxation of your efforts still further to increase that prosperity. The demands upon the funds of a Society established for the encouragement of natural science only multiply as the study of that science advances and becomes more general. The number of new works which we ought to add to our library for the use of our working members is greater every year; and much as we have extended our publications, we would wish to do so still more. New theories and speculations, popular and elementary works, find indeed that ready sale in the general world which renders them independent of associations like ours; but we must facilitate the publication of abstract researches and records of observation of detail, which are often remunerative only in the inverse proportion of their value; for we may thus assist in guarding against the perversion of the science by the multitude of crude but showy works issued in its name to please the paying public. I sincerely trust, therefore, that not only will our present members continue that support which is so necessary for our objects, but that they will induce such of their friends as feel an interest in natural science, and have either time or means at command, to join us in promoting the common cause. It has always appeared to me a mistaken idea that the Fellows of the Linnean Society should be limited to those who have shown a proficiency in natural science; we should hope indeed to include all such in our body; but they require the encouragement of friends and patrons, and work with increased zeal when aided by the association of those lovers of natural history, who, having little leisure to devote to it, contribute nevertheless to our means, attend occasionally our meetings, glance over our proceedings, and generally watch our progress.

With respect to the working Fellows of the Society, whose numbers have augmented so much of late years, I trust it will not be thought presumptuous on my part if, in enumerating a few of the principal

zoological and botanical works which have recently appeared, I also call their attention to a few points, the investigation of which seems to be specially required at the present time. It is true that the leaders of the science whom we are proud to reckon among our Fellows may well consider these remarks as superfluous, but I now address myself more especially to those who, having but a portion of their time to devote to natural history, or limited materials at their disposal, may be pleased to have their attention directed to a few subjects upon which their observations, however minute and isolated, may, if careful and accurate, contribute usefully to the general advancement of science. And if I take my illustrations chiefly from Botany, it is because that is the branch more immediately connected with my own pursuits; but the same principles are applicable to zoological investigations, the intimate connexion of the two sciences in all their details becoming every day more evident, and I have to thank my friend Mr. Busk for the selection of those new zoological works which appeared most deserving of notice on the present occasion.

The field of the science is so extensive, and its surface so varied, that we must take separately the salient points from which we can penetrate into its depths. I do not allude to the divisions of the science according to the groups of animals or plants treated of; but in each department the attention of zoologists or botanists may be separately directed to general systems and classification, monographs, floras or faunas, descriptions of individual collections, animal and vegetable physiology, including homology of organs and comparative anatomy and biology—if that name may be applied to the history of animal and vegetable life—independently of organic chemistry, palæontology, practical zoology and botany, and other branches which only partially come within the limits assigned to us.

Upon general systems and classification the few words I should have to say would be more in terms of deprecation than of encouragement. The great groups into which animals and plants have been distributed have been gradually established and characterized by the combined genius and lifelong labours of the most eminent naturalists, and no modifications can be accepted until their effects shall have been tested in all their details. All these systems are no doubt susceptible of improvement, and the investigation of characters to be derived from organs hitherto neglected, either from their minuteness or from other causes, might be of great importance, and would always be a legitimate object of our researches. Well-digested series of observations on the position of the ovule, the direc-

tion of its raphe and micropyle, considered with reference to their constancy or variability in large groups of plants, verifying and following up those which have been already published by one of our most careful observers, Mr. Benjamin Clarke,—on the constancy in genera or orders of those various forms of pollen, which have been described in detail by Mohl, Schacht and others as prevalent in large groups, but some of which Mr. Darwin has recently shown to be individual differences in different flowers of the same species,—on the conformity of anatomical structure of the stem with other characters on which large groups are formed, which has chiefly occupied the attention of French botanists,—and any similar researches would be valuable contributions to our publications, provided their authors do not, by attaching an undue or, at any rate, premature importance to characters they have thus brought to light, proceed at once to generalization, remodelling the whole system of classification, and throwing everything into confusion by new names and new combinations which can never be safely adopted without re-examining and testing in detail that complication of characters upon which the old ones had been gradually established. Tabular arrangements of classes, orders, and minor groups, regularly defined by new characters, are tempting to make, and may look well on a black board; but if we have hitherto refused a place in our Transactions to those which have been offered to us, and if I do not here allude in particular to any of those which we are continually receiving, it is because we have seen no evidence of their being more than theoretical speculations, untested by a study of the innumerable exceptions which Nature offers to all our systems. And on this head I cannot resist applying to our own Transactions and Proceedings the words of Cuvier, prefixed to the *Nouvelles Annales du Muséum*, in 1832:—“ L’expérience leur a appris, que ce qui dans des recueils de ce genre conserve un intérêt durable, ce que les savants consultent longtemps encore après la publication, ce sont les descriptions exactes et les bonnes figures d’espèces nouvelles, les caractères nouveaux découverts dans les espèces anciennes et propres à en rendre la distribution plus naturelle, ou la détermination plus précise, les faits nouveaux bien constatés dans leur histoire, les détails positifs et bien décrits de leur anatomie . . . . enfin tout ce qui, une fois consigné par écrit, demeure comme une partie intégrante de la science. Chacun peut s’apercevoir, au contraire, que les pures conceptions de l’esprit, les dissertations théoriques, les hypothèses variables au gré de l’imagination qui les crée, en se renversant l’une l’autre d’année en année, quelque éclat qu’elles puissent jeter, quelque bruit qu’elles puissent faire au moment où elle paraissent, tombent

bientôt dans le même oubli où sont tombées les hypothèses et les théories qui les avaient précédées, et qu'après quelque temps, les écrits où on les a exposées ne sont plus recherchés que par les curieux qui ne veulent ignorer aucun trait de l'histoire des sciences, laquelle n'est que trop souvent l'histoire des aberrations de l'esprit humain."

But if general systems are now too vast and comprehensive to be interfered with by the zoologist or botanist who cannot devote his life to the subject, he may, by limiting his researches to such portions as he can thoroughly investigate—to monographs of new or imperfectly known species, genera, or orders—supply contributions of the highest value to the science. If any naturalist has the opportunity of examining or studying any little-known animal or plant, or any group hitherto comparatively neglected or misunderstood, if he will draw up his descriptions from actual observation of specimens, carefully collating all that has been previously published on the subject, comparing the subjects of his investigation with allied species or groups—not with their published descriptions only, but with actual specimens, attaching more importance to giving good characters to the groups he forms than to multiplying their names, and, above all, taking every precaution to insure accuracy of detail, and verifying, by repeated examination of different specimens, every observation which may be new or at variance with those of his predecessors, he may be sure that his labours will be duly appreciated. Papers of this kind, when not attractive as works of art, are indeed not generally remunerative to their publishers; but we should always consider it a legitimate application of our funds to insert them in our Transactions or in our Journal, with more or less of illustration according to their scientific interest or importance.

Amongst zoological monographs which have been most recently published, Mr. Busk has called my attention to the completion of Mr. Gould's splendid work on the Trochilidæ, unrivalled in the beauty and fidelity of the plates, and containing in the introductory portion an interesting and compendious account of the distribution and classification of Humming-birds. In the subkingdom Mollusca, the elaborate memoir of M. Lacaze-Duthiers (whom you have just elected into one of the vacancies among our Foreign Members) on the Anatomy and Embryology of *Vermetus* has added much to our knowledge of Molluscan organization. Under Crustacea I should notice Professor Leydig's Natural History of the Daphnidæ; and under Arachnida, Professor Leuckart's important memoir on the Structure and Development of the Pentastomata, and Dr. Pagen-

stecher's Contributions to the Anatomy of the *Acari* or Mites. In the lower subkingdoms Professor Milne-Edwards's Natural History of Corals and Polypes has been completed by the publication of the third volume, whilst the works of Claparède and Lachmann and of Stein on the classification and organization of the Infusoria, and especially of M. Balbiani on the reproduction of those animals, cannot but be regarded as of the greatest interest and value. Nor can the important and curious observations of Dr. George Wallich and of M. Alphonse Milne-Edwards on the existence of even highly organized animal life at enormous depths in the sea be passed over without especial notice, subversive as they are of many of the hitherto prevalent notions on the subject, and of the highest interest in several points of view.

In Cryptogamic Botany I need not mention the numerous illustrated fern-works which the present fashion has called forth; for the majority of them are hardly scientific; but I cannot pass over the elaborate and careful Species Filicum of Sir William Hooker, of which the 13th Part, comprising the first portion of the most difficult Aspidiæ, has been lately issued, without expressing my most anxious hope that its distinguished author may long enjoy his present health and vigour, so as to bring that valuable work to a conclusion. I must also refer to Tulasne's beautifully illustrated Selecta Fungorum Carpologia as the most important work on fungi which has appeared for a long time.

In Phænogamic Botany we have not within the last year or two witnessed the publication of any of those model monographs of Orders of which we owed so many to the late Adrien de Jussieu and others of the French school; Weddell's Urticæ being one of the last that has appeared. But several monographic papers have been inserted in Journals or Transactions of Societies which may illustrate the principles I have above alluded to. Of those orders which, having been treated only in the early volumes of DeCandolle's Prodrômus, have now required a thorough revision, a considerable number have been the subject of more or less complete monographs, amongst which I would particularly mention Planchon and Triana's Guttiferæ in the Annales des Sciences Naturelles, and Prof. Oliver's Aurantiacæ in our own Journal,—both of them valuable contributions to science as examples of thorough investigation, careful observation, and sound criticism; whilst M. Jacob Müller, who in a three days' excursion in the Vosges finds 31 new Brambles, and devotes 40 pages of the Bonplandia to their description, and 225 pages of the Pollichia to 239 *Rubi* from a very limited Gallo-Germanic region, may be said

to have done little more than supply the world with so much waste paper. Of DeCandolle's *Prodromus* itself, which is now a series of monographs, a half-volume, comprising the genus *Euphorbia*, has been recently published. The remainder of the order of Euphorbiaceæ, one of the most extensive as well as the most varied and complex in structure and affinities of the whole vegetable kingdom, is now in the hands of M. J. Müller of Geneva, who, besides the special difficulties of the subject, will have to collate and bring into concordance the works of two laborious and careful observers of opposite tendencies—the late Dr. Klotzsch leaning to a multiplication of technical genera, and M. Baillon to the adoption of theoretical genera without contrasted characters or systematic arrangement. Laurineæ, an order as difficult from the great similarity of its genera and species as Euphorbiaceæ from their diversity, are, I believe, nearly ready for press, from the experienced hands of Prof. Meisner; and M. DeCandolle himself is working out the Amentaceæ. Among the orders not intended to be included in the *Prodromus*, I must notice M. Weddell's valuable monograph of *Cynomorium*, and the appearance of a third part of Dr. Boott's beautiful *Illustrations* of the genus *Carex*. This important work, which at great cost of time and money its distinguished author, in every sense of the word, has presented to science, now brings down to 411 the number of species or marked varieties of this difficult genus, whose characters are thus permanently fixed by detailed and accurate delineations. Gramineæ, which have been thrown into so much confusion by the so-called synopsis of Steudel, have been taken in hand by several botanists; but, whilst Dr. E. A. Rémy is indulging in new systems founded upon insufficient investigations of detail, and Dr. Ch. Müller multiplies phytogeographical species, Col. Munro is perhaps the only one who has devoted to them the care and research necessary for a good monograph. As yet, however, he has published but little beyond the *Revision of the Grasses of the Linnean Herbarium*, inserted in our own *Journal*.

Another class of writings by which science may be advanced by the descriptive naturalist comprises what are generally designated as *Faunas* and *Floras*; and these would claim admission into our own publications, or encouragement as independent works, not only according to their intrinsic merit, but according to the countries they treat of.

These *Faunas* and *Floras* have a twofold purpose to answer:—1st, as guides to the beginner or amateur, to the travelling or resident naturalist, in the determination and history of the animals

and plants of any particular country or district; 2ndly, to supply data to the general naturalist in his investigation of questions of geographical distribution and local influences on individual species or genera, independently of their utility in practical zoology and botany. For the former purpose, clearly contrasted characters adapted to local varieties or forms are the great desideratum; for the second, completeness and, above all, accurate determination and careful comparison with identical or allied forms in adjoining or more distant countries. It is satisfactory, therefore, to observe that authors of the most recent local Faunas and Floras, or enumerations of species, are perceiving the necessity of studying the animals or plants of other countries besides their own; and the designation of the local *habitats* of their species is now generally followed by that of their general geographical distribution, which it is to be hoped will be always either founded on actual inspection of specimens or accompanied by a reference to the authority relied on.

Our Society was chartered for "the cultivation of the Science of Natural History in all its branches, more especially of the Natural History of Great Britain and Ireland;" but with regard, at least, to the higher animals and phænogamic plants of our country, the great and increasing interest taken in them by the paying public leaves us as a Society little or nothing to do. The British quadrupeds, birds, fishes, and the more showy insects, are illustrated in works of great merit; and fresh editions of our standard Floras succeed each other rapidly. It is little more than a twelvemonth since the publication of the eighth edition of Hooker's Flora by Arnott, and the fifth of Babington's Manual has been issued in the present month; each one incorporating whatever recent observations may have added to or corrected in the previous ones. In the latter work I particularly notice that, besides numerous amendments of detail, Prof. Babington has remodelled his synopsis of the natural orders after the plan of the French analytical keys. All notices of new localities and enumerations of species observed in local districts would therefore be more useful if communicated to the editors of these works, than if sent to our Society for insertion in our records. It is in the lower orders of animals, and in some branches of Cryptogamic Botany, that much remains to be observed and described before the inhabitants of our island can be said to be well known. Some important contributions have recently appeared, amongst which I would especially notice the History of British Sessile-eyed Crustacea, by Messrs. Spence Bate and Westwood; the Monograph of British Spiders, by Mr. Blackwall, the first volume of which has been

published by the Ray Society; and Mr. Gosse's *Actinologia Britannica*: to these I might add Mr. Lubbock's *History of our Smynturidæ*, now printing for our Transactions, which reveals to us so much of interest and novelty in a whole series of creatures swarming around us, and yet hitherto allowed to pass almost unnoticed.

Turning to the Continent, the greater part of Europe comprised in the general districts of France, Germany, Scandinavia, and Russia is almost as rich as ourselves in general and local Floras. The works of Grenier and Godron, Koch, Reichenbach, Fries, Hartmann, and Ledebour, give us a very good account of the phænogamic vegetation of central and northern Europe; and I notice amongst recent additions, besides a carefully revised edition of Cosson and Germain's *Flore des Environs de Paris*, the first part of a new and elaborate Flora of Norway, by Professor Blytt, containing the Monocotyledons, upon which the author has evidently bestowed the greatest pains. All that is known of the Arctic Flora has also been condensed and applied more especially to the extension of geographical botany, in Dr. Hooker's important paper in the last part of our Transactions. In the south of Europe the Italians are not far behind. Bertoloni's voluminous *Flora Italica* is very complete, although not quite up to the present state of science. Parlatore's elaborate *Flora Italiana* has not yet got beyond Monocotyledons, which occupy two volumes. It is to be hoped that the very extended plan he has adopted may not stand in the way of its completion. In the meanwhile, they have many local Floras, amongst which Gussone's very careful *Synopsis of the Sicilian Flora*, rather overdone, perhaps, as to species, and Moris's excellent *Flora Sardoia* (that is to say, of the old kingdom of Sardinia), of which Dicotyledons are completed in three quarto volumes, are the most important. The Spanish Peninsula is much more in arrear. There is no professedly complete Flora since the four quartos of Quer, two of which are ante-Linnean, and the two last not much more recent; and most of what we have learnt in modern days of its vast botanical treasures has been from the works of foreigners, especially from the valuable and beautifully illustrated ones of Boissier and Willkomm. The herbaria of Madrid contain great stores of materials on which to found a Spanish Flora; and that Spain is not deficient in botanists well qualified to make use of them is shown by the scattered papers of Graells, Colmeiro, Costa, and others: yet it is again to a foreigner that they leave the task, and Willkomm, author of the splendid *Icones Plantarum Europæ Austro-occidentalis*, above alluded to, assisted by Dr. Lange of Copenhagen, has now issued the first volume of an octave Flora, completing



Monocotyledons and Apetalæ. The south-eastern peninsula of Europe, comprising Greece and Turkey, has still less means of publishing indigenous Floras. The Austrian portion alone has been well investigated and illustrated by Visiani's excellent *Flora Dalmatica*; what we know of the remainder has been due to the works of British, German, or French botanists, none of which are sufficiently recent or comprehensive to be here mentioned. The flora of the Levant, which, although technically a part of Asia, is in its natural productions so closely connected with southern Europe, and so particularly interesting as the country from which or through which so many early cultivated plants had proceeded, had, since the days of Tournefort, been little investigated until taken in hand by Boissier, who is preparing a general *Flora Orientalis*, in which it is hoped he will condense, and in some instances reform, the very numerous species described by himself and others. In the meantime, M. de Tchihatcheff has published a very useful general summary under the title of *Éléments d'une Flore de l'Asie Mineure*.

Beyond the limits of Europe, I may first refer to our own Colonies. A general summary of the steps taken to procure a uniform set of these floras was inserted, by Dr. Hooker, in the *Natural History Review* for July last, and I have only now to report progress. The fifth part, recently issued, of Grisebach's *Flora of the British West India Islands* has brought it down to the commencement of Monocotyledons; the fourth part of Thwaites's *Enumeration of Ceylon Plants* goes far into Monocotyledons; and each of these compact but comprehensive works will, it is hoped, be very shortly completed by the issue of one more part. The printing of the second volume of Harvey and Sonder's *Flora Capensis*, comprising *Leguminosæ* and *Calycifloræ*, is nearly finished. Our Indian botanists have been active, as evidenced by the *Præcursores Floræ Indicæ* of Drs. Hooker and Thomson, the *Flora Adenensis* of Dr. T. Anderson, Mr. Edgeworth's *Account of Punjâb Plants*, and other papers communicated to our Society; and although, some years since, an excellent opportunity for giving to the world a really good *Flora* of that rich and varied territory—more wanted, for a variety of purposes, than any other botanical work—was lost by an ill-advised want of liberality on the part of the then East India Company, I have now strong hopes that the present Indian Government will at length make such arrangement as will enable Dr. Hooker to lay before the scientific and industrial public, in the shape of a compendious *Flora Indica*, the results of his own important labours and

observations, aided by the vast materials collected at an enormous cost during the last half-century, and now deposited at Kew or in our own Museum. In Australia, Dr. Ferdinand Müller, the eminent Government Botanist of Victoria, has completed the first volume, comprising *Thalamifloræ*, of an elaborate account, in quarto, of the rich flora of that colony, illustrated by a considerable number of lithographic plates, which do credit to colonial art. This Flora is particularly valuable in showing the views in regard to the consolidation of supposed species entertained by a scientific botanist, working in a great measure upon living specimens. Of Dr. Harvey's beautifully illustrated *Phycologia Australica*, the fourth volume is now nearly completed.

The utility of Colonial Floras has been recognized by other Governments as well as our own. The practical Dutch have especially applied themselves to obtaining a correct knowledge of the vegetable productions of their dependencies. The numerous partial works of Blume, Korthals, Hasskarl, Junghuhn, and others, some of them splendidly illustrated, and, consequently, too expensive for ordinary use, have been condensed into a complete Flora van Nederlandsch Indie by Professor Miquel, who, in the course of six years, has given us the whole of *Phænogamia*, in four volumes, with a supplementary volume for Sumatra. We have not here, therefore, to bewail that tardiness which leaves so many important works unfinished at the death of their authors, or, if complete, with the first volumes antiquated before the last make their appearance; on the contrary, we could have wished that the author had given himself a little more time to work out the details with that accuracy of research which we should have expected from a botanist of his well-proved ability.

To the same class of Natural Histories of distant dependencies may be referred the results of the Russian expeditions to explore their newly acquired territories on the Amoor. Dr. Leopold v. Schrenck's *Reisen und Forschungen im Amur Lande* is one of the most important contributions to our knowledge of the fauna of Northern Asia, and of the geographical distribution of animals, and more especially of the *Mammalia*; whilst M. Maximovitch's *Primitiæ Floræ Amurensis* is an admirable account of the botany of the district as far as hitherto known, and of its physical geography in relation to vegetation. From the former, amongst the numerous interesting observations it contains, we learn the startling fact of the existence of the Tiger as a permanent and ordinary resident, even in winter, on the Amoor, or up to about the 50th degree of N. latitude, where, as shown by Maximovitch, the river is frozen over for at least six

months of the year, and the thermometer descends not unfrequently during the winter to below  $-30^{\circ}$  Reaumur ( $-36^{\circ}$  Fahrenheit).

The remainder of Asia comprises the two empires of China and Japan, which have been hitherto almost a sealed book to our naturalists. Japan, the flora of which had been partially known by the investigations and importations of Siebold, and is now proving a rich field for our horticultural collectors, has been the subject of a remarkable paper by Dr. Asa Gray, throwing a new light on the geographical relations of the floras of America and Asia; and a complete enumeration of all the species known to be indigenous to the Japanese islands, by Mr. Black, originally appended to Hodgson's 'Residence in Nagasaki,' has been inserted in a revised form in a recent number of the *Bonplandia*. But of the Chinese flora we still know nothing, except that of a few points on the coast or of the neighbourhood of Peking explored chiefly by Russian botanists.

The vegetation of Africa has lately been exciting a great deal of interest. When Harvey and Sonder's *Flora Capensis*, above alluded to, and the French official *Flore d'Algérie*, now apparently at a dead stop, shall have been completed, those two works, with A. Richards's *Flora of Abyssinia*, Webb's great work on the Canary Islands, and Lowe's *Madeira Flora*, of which the second part has now appeared, will have given us a fair idea of the principal extra-tropical or subtropical regions; but from within the tropics little has been done as yet towards publishing the very great additions now being made to its known vegetation. The collections of the late Mr. Barter, and especially of our present active and enterprising botanical traveller, Mr. G. Mann, have thrown a new light on the geographical relations of the Western Flora. Dr. Kirk has remitted to us, from the Eastern side, many interesting novelties, notwithstanding the loss of an important portion of his collections in a whirlpool on the Zambesi; and Dr. Welwitsch's arduous travels in the Mossamede and Angola country would have been fully rewarded even had their results been limited to the discovery of the *Welwitschia*, that misshapen mass representing the tree vegetation of those sandy coasts, of which specimens were recently laid before you, and whose wonderful structure will, I hope, be explained by Dr. Hooker in all its scientific bearings in the next part of our Transactions. Of all these riches but little has yet been published. Dr. Hooker has given us an interesting account of the vegetation of Clarence Peak, to be followed, I hope, ere long, by a paper on the still more remarkable collection just received from the Cameroon Mountains. The first portion of the description of the plants collected

in Mosambique by Dr. Peters has been published at Berlin in a pretentious illustrated volume, chiefly by the late Dr. Klotzsch. Dr. Welwitsch has given a preliminary list of the Angola portion of his collections, in the *Annales do Conselho Ultramarino* for 1858; Dr. Wawra and M. Peyritsch, in a *Sertum Benguelense*, have described a small set of Benguelan plants gathered by the former during a fortnight's stay of the Austrian corvette *Carolina* on that coast; and a few detached papers on isolated genera or species have appeared here or at Paris. I may add, however, that there is now some hope that our Admiralty is about to take steps for obtaining some practical result from these botanical expeditions, in the shape of a General Flora of tropical Africa.

Next to tropical Africa, the most remarkable novelties in botany are supplied by New Caledonia and Madagascar. These are chiefly in French hands; and detached notices of some of them have appeared in various French periodicals. I understand, also, that the authorities of the *Jardin des Plantes* are in hopes of inducing their Government to sanction at least a Flora of New Caledonia, in imitation of the Colonial Floras of other Governments.

There remains the New World; and here my first feeling is one of deep pain, in which all lovers of progress and civilization must partake. The deplorable internecine contest now going on in the once United States of North America appears to have put a stop to all works of importance in natural history, so many of which were supported at considerable cost by their Government. Dr. Torrey's papers on Fremont's Californian Plants and Mr. Chapman's Flora of the Southern States were fortunately completed before the outbreak; but the valuable publications of Dr. A. Gray on their own flora, or on that of various countries visited by their expeditions or collectors, remain incomplete, or are only continued in abridged notices in *Proceedings* of some of their Societies. I feel sure that every lover of science will join in the fervent wish that our gifted cousins may soon turn from scenes of bloodshed, and again devote themselves to the cultivation of the arts of peace and progress.

In South America there are two States whose comparative tranquillity has enabled their Governments to pay some attention to the calls of science. The vast empire of Brazil is in a state of progress. Rio Janeiro has her Vellozian Society of Natural History, whose secretary, Dr. Capanema, has recently returned from accompanying as Naturalist an expedition for the investigation of the resources of several of the tropical districts; and it is chiefly the support of the Brazilian Government that enables Dr. v. Martius to continue the elaborate

Flora Brasiliensis which he edits. Of this costly work the parts published within the last twelvemonth comprise *Celastrineæ*, *Ilicineæ* and *Rhamneæ*, by Dr. Reissek, *Scrophularineæ*, by Dr. J. Schmidt, and *Dalbergiæ* and *Sophoreæ*, completing my *Papilionaceæ*. Chile has also distinguished herself in Natural History. The Flora Chilena, completed at Paris a few years since for the Chilian Government by M. Claude Gay, has been followed by various papers by Dr. Philippi, Professor of Zoology and Botany in the University of Santiago, and Director of a Museum which he appears almost to have founded there. Amongst these, his Travels in, and Flora and Fauna of the Desert of Atacames, which, although published in Germany, was written at Santiago, deserves especial notice. The flora of the remainder of South America is only known from the collections of travellers published in Europe, amongst which M. Weddell has completed the second volume of his valuable *Chloris Andina*, and Karsten the first of his *Flora Columbiana*. The latter, however, is not a Flora in the ordinary sense of the word, but a selection of new and little-known species, splendidly illustrated. It is only to be regretted that the beautifully executed and accurate analyses and careful descriptions should not have been accompanied by a little more literary research, for the proportion of already known genera or species given as new is greater than might have been expected. We had hoped also, ere this, to have had the first volume of Planchon and Triana's Flora of New Granada; but the promised aid on the part of the Government of that country has been delayed, although I trust not definitively stopped, by domestic revolutions.

Under the head of Faunas and Floras I would add a few words on the subject of illustrations of the results of scientific exploring expeditions. In these expeditions, undertaken at great cost, the labours of the zoological and botanical collectors who accompany them are often most liberally encouraged, and on their return home funds are supplied for the publication of the results, but not unfrequently upon terms which interfere much with their practical utility. It would seem as if the object were not so much to add to our knowledge of the productions of the countries visited, as to make a vain boast of the number of new genera or species discovered, or of the specimens collected. It is seldom that in these great expeditions there are not some countries more completely explored than had ever been previously the case, and whose faunas and floras, if rendered complete up to the present state of science, are great desiderata, whilst specimens gathered during a few days' stay at some

well-known port cannot be of much interest except to the collectors themselves. Take, for instance, the great United States Exploring Expedition under Captain Wilkes. Rich collections were made in the two comparatively little-known groups of the Sandwich and the Fiji Islands, both of them remarkable for the peculiarities of their vegetation, and complete Floras of these groups, such as the distinguished botanist entrusted with the Botany of the Expedition would have drawn up, had his advice been followed, would have been important contributions to science. In lieu of this, we have the commencement of a work far too splendid in typography and illustration to be within reach of many botanists, never likely to be finished, and in which a large space of the text is occupied by an enumeration of some of the commonest plants picked up at Rio Janeiro, Port Jackson, the Cape of Good Hope, and other well-known ports. Professor Gray's short memoir above mentioned, on the Botany of Japan, one of the results of a subsequent expedition under Captain Ringgold, has contributed far more to the advancement of science than the pretentious volume insisted on by Captain Wilkes. Again, the Botany of Prince Waldemar's Journey in the Himalaya, by the late Dr. Klotzsch and Dr. Garcke, which has just appeared, is an instance of a costly work of little use beyond showing off the herborizations made under princely auspices. The number of species collected is very small compared with the rich stores from the same country long since distributed among the principal herbaria of Europe, and full half of what are given as new are identical with or slight varieties of well-known plants. On the other hand, we may well be proud of the results of our own Antarctic Expedition in the three splendid and complete Floras of Dr. Hooker, treated in the manner most conducive to the progress of science, without any attempt to give prominence to the author's own labours. It is to be hoped that such Faunas and Floras of places specially visited, such as the Nicobar Islands, will form a prominent feature in the forthcoming Zoologies and Botany of the Austrian Novara Expedition.

The details into which I have been led, with reference to my own special subject of Systematic and Descriptive Botany, leave me no time to advert to recent works on Physiology, which, taken in its largest sense, is that important part of the study of nature for which systems and descriptions are but the means. There is, however, one branch, that which I have above termed Biology, upon which I should wish to say a few words, in order to call the attention of our Fellows resident in the country to a field of inquiry comparatively untrodden, and upon which any series of carefully con-

ducted observations would be of the greatest interest both at our meetings and in our publications. The remarkable success which has attended the long-continued, persevering and well-combined observations of Mr. Darwin should stimulate others to follow in the same track; and much as he has disclosed, much as he has still in store for us, his every page shows how far even he is yet from having exhausted the subject. I do not refer to those speculations on the origin of species, which have excited so much controversy; for the discussion of that question, when considered only with reference to the comparative plausibility of opposite hypotheses, is beyond the province of our Society. Attempts to bring it forward at our meetings were very judiciously checked by my predecessor in this Chair, and I certainly should be sorry to see our time taken up by theoretical arguments not accompanied by the disclosure of new facts or observations. But we must all admire that patient study of the habits of life, with that great power of combining facts, which has revealed to us so much of surprising novelty in the economy of nature. The wonderful contrivances for the cross-fertilization of Orchids, so graphically detailed in Mr. Darwin's new work, and which rival all that had been previously observed in the singular economy of insect life, had been hitherto unsuspected even by those botanists who had specially devoted themselves to that family. And this is but a sample of that extraordinary variety of facts collected by him and brought to bear upon his theories, which must be patent to every impartial reader of his works, whilst all who have had an opportunity of watching his *modus operandi* are well aware that he never brings forward an observation without taking every precaution to ensure its accuracy, thoroughly sifting every circumstance that appears to militate against it. It is indeed to be hoped that, without waiting for the completion of the great work that is to embody the whole series of his *pièces justificatives*, Mr. Darwin will continue to illustrate separate portions of his subject, each one of which is sufficient to give a lasting name to its author. In the meantime let every lover of nature who, from his residence in the country, may have leisure and opportunities of observing, follow in the track thus opened out. If he will carefully watch the gradual development and daily habits, at all seasons of the year, of the animal or vegetable productions which are around him in the greatest abundance, he will detect many a curious arrangement by which nature, in causing animals and plants, or different species of each, to act and react on each other, provides for the perpetuation of species, races,

or individual varieties, against the ever-present causes of destruction, and at the same time checks that over-multiplication which might result from those very provisions. Those sudden appearances of myriads of insects known in rural districts under the name of blight, their enormous means of multiplication, and their almost total disappearance the following season are as yet a mystery to us, both as to their cause and their influences. The perusal of Mr. Darwin's first chapters will show that there is much still to ascertain in the action of insects even on our common Orchids; and how little do we know of the real history of the life of those sets of plants upon whose external forms volumes have been published! How is it that when our hedges are annually loaded with the fruit of the bramble, or our fields covered with the down of *Carduus arvensis*, we seldom see a seedling of the one or the other?—nature having concurrently provided for their propagation by the inarching and rooting stems of the former and the creeping rhizomes of the latter. How is it that in many localities every individual *Epilobium montanum*, before it dies down in the autumn, has surrounded itself not only by numerous offshoots, each one armed against the rigours of winter so as to form an independent new plant in the spring, but also by a wide-spreading progeny already born from the hundreds or even thousands of seeds it has shed; and yet when we examine the same spot the following year, the number of *Epilobiums* has not increased, and you may look long before you find among them a single seedling, every individual you uproot proving to be the result of a previous year's offshoot? In this excessive multiplication of autumn seedlings have we perchance a provision in aid of insect or other animal life—something analogous to that concurrence of natural causes, which at one of your last year's meetings was described as insect horticulture? We usually close our observation of living plants in October, and recommence it in March, when in many respects a total change has taken place: the gradual progress of that change remains to be watched. I am well aware that numerous papers on the life and development of plants have been published, more especially in French and German periodicals, and must be consulted by observers before they can safely draw any conclusion; but many of these treat the subject solely with a view to specific distinction, and scarcely ever in relation to habits induced by external influences of station and climate, still less with reference to that connexion with insect life revealed by Mr. Darwin. We have had enough of splitting of hairs and counting of spots, and of idle controversies as to whether



they indicate species, varieties, or individual differences. Let us adopt for the insects and plants of our islands the nomenclature and classification the most convenient for study, and devote our attention to their economy and development, to the complicated structures disclosed by the microscope, and to those innumerable influences which we term accidental, but which appear all to form part of one general plan for the balance of power in the natural world. If, at this time next year, I am still honoured by a seat in this Chair, I hope to lay before you a sketch of the state of those branches of our studies which I have now been unable to touch upon; and it will be a matter of great gratification to me, if I have to report that many a Fellow of the Society may have taken a leaf out of Mr. Darwin's book, and commenced a series of observations on some of the subjects I have alluded to.

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#### OBITUARY NOTICES.

The Secretary then read the following Notices of deceased *Honorary Members, Fellows, Foreign Members, and Associates.*

Of the three illustrious names enrolled as *Honorary Members* of this Society, we have to lament the loss of two within the last twelvemonth, both in the prime of life, and both more than usually distinguished, not only for their sincere and earnest endeavours to promote the cause of science, but also for their extensive knowledge and liberal minds.

Of his late ROYAL HIGHNESS THE PRINCE CONSORT, whose death we have all so deeply mourned, and whose memory will ever be so dear to the community he loved to serve, it is scarcely necessary on the present occasion to say more than that we, as a scientific body, have in him more especially to lament the loss of one who at all times evinced the most earnest desire to promote science, and was enabled to do so from his wide-spread acquaintance with almost every branch of it.

The memory of his MAJESTY DON PEDRO V., King of Portugal, demands more than a mere passing notice. Irrespective of his exalted station, his individual character as an earnest worker and munificent patron of science, and more especially of natural history, requires that I should offer some account of his brief but useful career.

Though many monarchs have deservedly been known as the

patrons and promoters of science, there are few who can themselves be justly placed on its rolls. But it was not so with the late King of Portugal, who was distinguished not only for the enlightened and discriminating encouragement he afforded to science in all its branches, but was also himself no mean proficient in many of them.

He was born in Lisbon on the 16th of September, 1837, the eldest son of Donna Maria II., on whose death he ascended the throne, in his seventeenth year, on the 15th of November, 1853. In May 1858 he married the Princess Stephanie of Hohenzollern-Sigmaringen, but had the misfortune to lose his consort in the following year. The uncertain and often unfortunate circumstances, domestic or political, by which his early years were saddened, the unhappy loss of his young wife, and the misfortunes from epidemic disease and political commotions with which his short reign was afflicted and disturbed, all contributed to give his character a tinge of melancholy and sadness ; although at the same time the trials through which he passed served to bring out into stronger relief, the amiable, kind, and considerate disposition with which he was naturally endowed. On ascending the throne, one of the first tasks he undertook was to make himself acquainted with his country and his people, and with this view he was yearly in the habit of journeying into the various provinces of the kingdom, in one of which expeditions he may be said to have fallen a victim to this self-imposed duty, being attacked, soon after his return from the province of Alemtejo, by a fever which carried him off on the 11th of November, 1861,—two of his brothers, Don Fernando and Don João, being also struck down by the same malady.

Don Pedro had received a careful and liberal education, and of course, from his exalted position, enjoyed unusual opportunities for the acquirement of knowledge. But it was mainly to his own talents, zeal, and industry, after he had reached man's estate, that he was indebted for the vast amount of accurate knowledge he was generally acknowledged to possess.

From an early age he exhibited a strong inclination for the study of natural history, in which he was also much encouraged by his father, Don Fernando, himself distinguished as an artist and man of science. While still Crown Prince, he founded a Museum of Natural History in the Palace of Necessidades, and in all his travels, both at home and abroad, he lost no opportunity of adding to the stores of his Museum, or of his extensive Library of Natural History. He was also much attached to the society and correspondence of men

of science of all nations, and thus kept himself well acquainted with the progress of knowledge throughout the world.

In natural history he devoted most attention to conchology and ornithology, in both of which departments his Museum was very rich, including, in particular, an almost complete collection of the birds of Portugal, nearly all procured and classified by himself; and in 1861 he published a "List of about 200 Species of Portuguese Birds," in the 'Gazeta Medica de Lisboa.' But, not content with the limits of his own dominions, he aimed at the collection of typical specimens of all exotic *genera* of birds and shells; and his Museum, in consequence, in late years was enriched with most of the typical forms of birds, procured, regardless of cost or trouble, from all parts, and illustrated by all the more valuable works relating to ornithology.

But, besides these efforts in the cause of science, his brief reign will long be remembered from the constant endeavours he manifested to improve in all ways the well-being and intellectual improvement of his people, and prove himself in every respect worthy of the eminent post to which Providence had called him.

*Edward Barnard, Esq., F.R.H.S.*, was born on the 14th of March, 1786, and became a Fellow of the Linnean Society on the 17th of February, 1818. He was educated at Eton, which school he left in 1804, when he entered the Colonial Office, an employment in which he continued during the remainder of his life. In 1825 he was appointed by Lord Liverpool to the office of Agent-General for the Crown Colonies.

Mr. Barnard was devoted principally to horticultural pursuits, and was for many years a Fellow and Member of Council of the Horticultural Society, at whose Meetings\* he contributed several communications or notices with reference to the cultivation of certain flowers. The singular plant, *Ammobium alatum*, R. Br., is stated to have been raised, in 1822, from seeds transmitted from New South Wales, and presented to the Society by Mr. Barnard. He was also one of the original Fellows of the Zoological Society, and gave much valuable assistance in the laying out of the gardens both of that Society in the Regent's Park and of the Horticultural Society at Chiswick.

He died suddenly of an apoplectic attack on the 13th of December, 1861.

*William Borrer, Esq.*, was born at Henfield, in the county of Sussex, on the 13th of June, 1781, and was the eldest son of

\* They are not *published*, but very briefly *noticed*, in the 'Transactions.'

William Borrer, Esq., who was at that time residing there; but shortly after the birth of his son, he removed to Hurstpierpoint, only a few miles distant.

The education of the subject of this notice was there commenced, at a mixed school, where he showed great industry and perseverance, and made rapid progress in his studies.

At the age of 13 or 14 he was removed to a school at Carshalton, in Surrey, conducted by Mr. John Morphew, a man of sound religious principles, with which he thoroughly imbued his pupil, and thus laid the foundation of that piety and uprightness for which in after-life Mr. Borrer was particularly distinguished.

At this school he continued little more than one year, and then returned to his home. This appears to have been the only portion of his education during which he received any assistance from others; but being exceedingly fond of reading, and of a very studious disposition, he neglected no opportunity of improving his mind, and he eventually became not only a most deeply-read divine, but also attained no mean proficiency in French and Latin, as well as in Greek, which latter language, from some prejudice, he was forbidden by his grandfather to be taught at school.

His father at this time wished him to become a farmer, like himself; but his own desire was to commence life as a physician; and these discordant views neutralized each other; so that though his father gave him a farm, and guaranteed him against loss, he did not succeed in raising in his son any desire of devoting himself to agriculture.

Mr. Borrer was now frequently, and often very arduously, engaged in carrying on business for his father, who was very profitably employed in contracts for the supply of hay, corn, &c., for the use of the large body of troops at that time stationed at Lewes, Brighton, and other portions of the south coast.

In the course of the transaction of business of this nature, Mr. Borrer, performing all his journeys on horseback, devoted his attention especially to the natural productions of those districts; and, wherever his father's engagements might lead him, he never neglected any opportunity of collecting, examining, and preserving all attainable specimens.

To this study he had, in fact, a bent from his earliest years; and his brother, Mr. John Borrer of Portslade, who was only some two years his junior, states that he does not remember the time when he was not enthusiastic in his love for flowers, and in his admiration of

the vegetable world in general; so that there was no muddy ditch, no old wall, no stock of a tree, no rock or dell, no pool of water or bay of the sea that did not add to his delight, nor open to him a wide field for investigation or enjoyment.

Mr. Borrer received his earliest encouragement in his favourite pursuit from one or two of the officers of a camp which had been formed near his father's house, and who passed much of their leisure time in his company.

The 'English Botany' is a work in which he took, from the first, the highest interest, and he would frequently ride to Lewes to get the number a day sooner than he could otherwise have obtained it.

Being always of a very studious habit and of great energy and perseverance, he soon raised himself to considerable eminence in the botanical world, and had early in life a large botanical correspondence, though, being naturally fond of retirement, he never sought what is called society for its own sake.

The greatest encouragement in his botanical pursuits was afterwards derived from his acquaintance with Dawson Turner, Esq., with whom he spent much of his time, and corresponded for many years, and who introduced him to the present Sir W. J. Hooker, with whom, as with Joseph Woods, Esq., and the late Edward Forster, he formed an intimacy and friendship which remained undisturbed for more than half a century.

At the age of twenty-nine he married the eldest daughter of N. Hall, Esq., at that time a banker in Brighton, when he went to live in a house built for him by his father at Henfield.

In 1805, Mr. Borrer became a Fellow of the Linnean Society. He was also a member of the Royal Society and of the Wernerian Natural History Society of Edinburgh. He was for many years in the commission of the peace for the county of Sussex, though he never took an active part in public business.

In 1810 he was engaged, in company with Sir W. J. Hooker, in a botanical tour in Scotland; and at another period he visited Normandy with a similar object. Of these tours he has left no record, and, with this one exception, his investigations were confined to the British Isles.

In carrying out his botanical researches, Mr. Borrer showed great energy, being for many years, when informed of the discovery of a new plant, in the habit of personally visiting its site. On some occasions, having observed plants whilst travelling by rail, he has stopped at the next station and proceeded to the spot by post. In

this manner he discovered *Barbarea stricta*, between Sheffield and Halifax. To his quick discrimination, also, the British Flora is indebted, I believe, for *Leersia oryzoides*, which, first noticed by him in the Henfield Levels, has since been found abundantly at other places in Sussex and Hampshire. Another interesting plant, *Isnardia palustris*, was also first noticed by him as a British native in 1827, in a pool at Buxtead, Sussex.

While thus successful and sharp-sighted himself, he was, moreover, equally skilful in testing the alleged discoveries of others. A Westmoreland "guide," in the Lake District, had represented that he had discovered, in that locality, a habitat for *Cypripedium Calceolus*; but Mr. Borrer, doubting the correctness of the statement, was at pains to visit the spot for three years successively, at the time of flowering of the plant, and was at length able to expose the attempted imposition.

Zealous and able botanist as he was, Mr. Borrer published scarcely anything under his own name or in a separate form. He was, however, a constant contributor to science in other ways, and especially in the Supplement to 'English Botany.' The Lichens throughout that work were very generally described by him, as were also most of the *Salices*, *Rubi*, and *Roses*, to which genera he had paid particular attention; and in the preface to the 'British Flora,' Sir W. J. Hooker acknowledges his great obligations to Mr. Borrer, more particularly for a complete revision of the genera *Myosotis*, *Rosa*, and *Rubus*.

The only other separate work, as it would seem, under his name, and then not alone, was commenced and partially carried out by him, in conjunction with Mr. Dawson Turner, in the year 1813, although its publication, partly owing to the death and derangement in the affairs of the publisher, was delayed till 1839. The work, modestly entitled 'An Attempt at a History of the British Lichens,' was even then brought out by his coadjutor, Mr. Turner, for private circulation only, that gentleman's object being (to quote his words in an introductory letter to Mr. Borrer), "that it may remain a monument of your industry, your ability, and your profound knowledge of the family of Lichens." And the dedication, which is also addressed to Mr. Borrer, commences in the following affecting terms:—

"More than twenty-six years have now gone by, since you and I, warm with the hopes of youth, and sanguine in its projects, wrote and printed the contents of this little volume. That its progress was thus interrupted, and that we stopped in the vestibule of our

inquiries, was unquestionably owing, in a certain degree, to circumstances, but was, I fear, principally my fault. I own, with regret, that the cause lay too much in fickleness of pursuit on my part, unfortunately seconded by an unwarrantable modesty and distrust of yourself on yours."

Mr. Borrer's extensive and valuable collections of plants, as well as the ample stores of his exact knowledge, were always at the service of his friends and fellow-labourers. His garden also, which he began to form immediately on being established in premises of his own, gradually increased till it became one of the best, if not the very best collection in this country, of living plants which are capable of bearing its climate. In the autumn of 1860, his gardener, Charles Green, who, under Mr. Borrer's tuition, had acquired considerable proficiency in botany, gave a list of 6660 plants contained in it; and amongst them were above 1000 annuals, a class which, owing to the constant attention required in collecting the seeds, is seldom cultivated to so great an extent.

But beyond Mr. Borrer's claims to remembrance as a patron and ardent promoter in his own person of botanical and the kindred sciences, his memory will by many be more warmly cherished in his own locality, from his numerous and unostentatious charities, and his zealous endeavours to promote the welfare and best interests of all with whom he was connected; and the poor always came to him as to a friend. He paid especial attention to the moral and religious advancement of his own parish, in which he was mainly instrumental in increasing the stipend of the incumbent; making also, at his own expense, large additions to the parish church, for the better accommodation of the school-children and of his own cottagers. For many years he attended with great interest to the National School, which was established principally by his exertions; and he also built on his own land a school for girls, and another for infants. Besides these attentions, he generally assembled, at his own house, three or four lads at a time, whom he educated himself for whatever business they might be disposed to choose; and these he afterwards apprenticed or placed in various situations; and there are many, whom he continued to watch over with what may be truly called a fatherly care, now in active business, and esteemed as ornaments to the community.

By his own brothers, who by their situation were most intimately acquainted with his early life, he has been described as remarkable for his clearsightedness in business, his high sense of religion, his intense abhorrence of anything approaching to vice or immo-

rality, and by his constant readiness to promote, by pecuniary assistance or by friendly advice, the advancement of all deserving applicants.

Up to the year 1851, Mr. Borrer had enjoyed the full vigour of an excellent constitution; but in that year he had a violent attack of illness, and though he sufficiently rallied even to enjoy several botanical excursions, he was from that time liable to frequent attacks of extreme debility. Yet he continued to take as much interest as ever in his garden and botanical collections, and was still, as through life, remarkable for his extreme accuracy and simplicity of style, whether in telling an anecdote or in describing a plant.

At Christmas 1861, he attended the annual distribution of prizes at the Henfield National School, in returning from which he took a severe cold, resulting in pleurisy, from the effects of which he died, peacefully and calmly as he had lived, on the 10th of January, 1862, in the 81st year of his age, deeply and deservedly lamented by his own numerous family, and by all who knew him.

*George Charwood, Esq.*, was formerly an eminent and much respected seedsman in Covent Garden. He was elected into the Linnean Society on the 16th of March, 1824, and died August 26, 1861, at Feltham, where he had long resided, aged 77.

*Albert John Hambrough, Esq.*, who died at 14 Prince's Terrace, Hyde Park, on the 6th June, of 1861, in his 41st year, had been but a few years a Fellow of this Society, having been elected only in February 1856. His usual residence was Steephill Castle, in the Isle of Wight, and he was well known as a zealous cultivator of the island flora.

*The Rev. Frederick W. Hope, D.C.L., F.R.S., &c.*, died on the 15th of April, 1862, at his house, 37 Upper Seymour Street, Portman Square. He was born on the 3rd of January, 1797, in the same house, being the second son of John Thomas Hope, Esq.

Entering Christchurch, Oxford, he graduated B.A. in 1820, and took his M.A. degree in 1823, and was ordained to the curacy of the family living of Frodesley, Shropshire, but his health did not long permit him to perform the duties of his profession.

During his residence at Oxford, he devoted his leisure hours to the study of zoology, and especially of entomology, with great zeal. To this study he was much incited by the precepts and example of Dr. Kidd, who was at that time Regius Professor of Medicine, and whose lessons on zoological subjects strongly fostered the growing taste of the young student, who, throughout his future career, looked up to his teacher with kind feelings of regard, which were testified



by his donation to the University Museum of a portrait of Dr. Kidd.

On leaving college, Mr. Hope pursued his zoological studies with great earnestness, not confining his attention to insects only (which, however, subsequently became his more especial favourites), but extending it to every branch of English animated nature, of which sufficient proofs appear in various notices in Mr. Yarrell's volumes on 'British Birds and Fishes.' His success as a collector of British insects was very great; and the extent of his collections, as well as the readiness with which he granted access to them to all persons engaged upon special works on various families, genera, &c., is abundantly testified by the constant reference made to them in Mr. Stephens's great work on English insects in general, commenced in 1828, in Gravenhorst's '*Ichneumonologia Europæa*,' 1829, and in Gory's great works on the *Cetoniadæ* and *Buprestidæ*. Mr. Hope, however, did not limit himself to English insects, but formed, at great expense, a very extensive exotic collection, which became famous on the Continent for the numerous Indian, African, and Australian rarities which he had succeeded in amassing.

On March 5th, 1822, he was elected a Fellow of the Linnean Society. He took an active part in the formation of the Zoological Society in 1826, and of the Entomological in 1833, and in both these societies he continued to take a warm and active interest. In 1835 he succeeded the late Mr. Children as President of the latter Society, which office he held for two years, the time limited by the bye-laws. His contributions to these different societies were very numerous. In these papers it may be remarked that his attention was not confined to the technical description of the numerous new species of insects contained in his collection, but that his inquiries were extended to many practical points in their economy, such as the supply of silk, the parasitism of insects in Man, the investigation of the insects mentioned in the Holy Scriptures, their ravages on growing wheat, &c., and on the submarine wooden constructions of our harbours, &c. He also published, in 1837-40, a separate work on Coleopterous Insects, in 3 vols. 8vo.

During the last twenty-two years of his life the state of his health required his residence, for a considerable portion of each year, in the warmer parts of Europe; and at Naples and Nice he continued his investigations, especially on the marine productions of those localities, forming large collections of fishes, Crustacea, &c., as well as of birds and shells. Being desirous of keeping these collections entire, and actuated by a strong devotion to his *alma mater*, in

the year 1849 he executed a deed of gift, making over his whole collection, as well as his library of books and engravings, to the University of Oxford, under certain conditions of a very liberal character, with reference to their being rendered available for promoting the study of natural history at Oxford. He still, however, continued annually to make large additions to the stores which he had thus assigned to the University. Thus in 1857 he secured the whole of Mr. Westwood's collections of insects, books, and drawings; and subsequently he acquired Mr. Wollaston's second and greatly enlarged collection of Madeira insects, the collection of Orkney birds formed by Mr. Hubbard during many years' residence in those islands (unrivalled for the beauty of the specimens and the various groups of young birds, with their parents and nests), as well as the Bell collection of reptiles. By this means the University now possesses a collection of insects inferior only in extent to those in the national museums of London, Berlin, and Paris, and an entomological library unrivalled both in the number and rarity of its contents.

Mr. Hope's bounty, however, was not confined to natural history, since his donations to the University of Oxford comprise one of the largest collections of engraved portraits and topographical illustrations ever formed, together with several thousand volumes of biographical, historical, topographical, and fine-art works, voyages, travels, &c., including the Jussieu collection of Academic Éloges, illustrating the collection of engravings, which cannot be considered as amounting, at the lowest estimate, to fewer than 200,000. Of these, the portraits cannot be fewer than 100,000, the topographical engravings from 60,000 to 70,000, and the natural-history engravings from 20,000 to 30,000. There is, moreover, a considerable number of engravings of a more miscellaneous character, including many by the old masters.

Mr. Hope's latest donation to the University consisted of the remarkable collection of the works of British Essayists formed by his father, consisting of about 1200 volumes, many of the greatest rarity.

In the year 1855 the first stone of the new Oxford Museum was laid, on which occasion the honorary degree of D.C.L. was conferred on Mr. Hope, whose various munificent donations were destined to be there deposited.

In 1861 Mr. Hope further testified his devotion to the University of Oxford by founding and endowing a Professorship of Geology, with more especial reference to the Invertebrata, to which chair he nominated our distinguished colleague, Mr. Westwood, as the first

Professor ; and it is understood that he has also made provision for the endowment of a keepership for the engravings, as well as for annual additions both to his entomological and art-collections.

*Robert Charles Hurst, Esq., M.R.C.S.E.*, was a medical practitioner at Bedford. He was elected into the Society on the 17th January, 1861, and died almost on the anniversary of his election, on the 16th January last, at a comparatively early age.

*John Thomas Quekett, Esq., F.R.S.*, was the fourth son of the Head Master of the Langport Grammar School, where he received his elementary education. At the early age of sixteen he showed the bent of his mind, and an earnest of his future eminence as a microscopist and zealous cultivator of science, by giving a course of lectures on microscopic subjects, illustrated by diagrams and a microscope of his own construction, the materials of this instrument being furnished by a common roasting-jack, a lady's old-fashioned parasol, and some pieces of brass purchased at a neighbouring marine-store shop, and fashioned by himself. He afterwards repaired to London and was apprenticed to his brother, the late Edwin Quekett, who was at that time Lecturer on Botany at the London Hospital Medical School ; and at this institution he was also entered a student. On the due completion of his studies, he became a Licentiate of the Apothecaries' Company and Member of the Royal College of Surgeons. The College having just then established a studentship in human and comparative anatomy, Mr. Quekett competed for the appointment, and was unanimously elected ; and he immediately set to work and formed a most extensive and valuable collection of microscopic preparations, which was afterwards purchased by the Council of the College, where it forms the chief part of the "Histological Series of the Museum"—a collection consisting of preparations of the elementary tissues, both healthy and morbid, of animals and plants, adapted to illustrate the results and uses of microscopical investigation.

In 1844, in pursuance of the object the college had in view in acquiring this valuable collection, Mr. Quekett was appointed to deliver an annual course of demonstrations with a view to its exhibition and connected description. A descriptive and illustrated catalogue of the collection, subsequently prepared by Mr. Quekett, under the superintendence of the Museum Committee, and of which the first volume was published in 1850, forms a striking monument of his unwearied industry and great skill as a histologist and microscopist.

At the conclusion of the period for which the studentship was tenable, viz. three years, Mr. Quekett was appointed Assistant Con-

servator of the Hunterian Museum; and on the retirement of Professor Owen, he was elected to succeed him as curator, and was also, as above stated, named professor of histology—appointments which he held at the time of his death. He was elected into the Linnean Society on the 17th March, 1857; and died at Pangbourne, in Berkshire, on the 20th August, 1861, at the early age of 46.

*Thomas Haswell Quigley, M.D.*, was a surgeon in the Royal Artillery. He was elected into the Society, November 20, 1821, and died June 14, 1861, at his residence, Mount Pleasant Square, Dublin.

*Sir James Clark Ross, F.R.S., F.R.A.S., F.G.S., &c.*, was born in London in the year 1800. In 1812 he was entered as a midshipman on board the 'Briseis,' commanded by his uncle Sir John Ross, the well-known Arctic navigator, and whom he accompanied on his first voyage to the Polar Seas in 1818. Between 1819 and 1827 he returned four times to the same regions, under the orders of Sir Edward Parry, by whom he was highly esteemed as a zealous and efficient officer. In the latter year he was raised to the rank of commander.

In different voyages to the Arctic Seas, again under the command of his uncle, between 1829 and 1833, the scientific observations were committed principally to his charge, and he was also repeatedly placed at the head of expeditions sent out from the ice-locked ship for the exploration of the surrounding country. In the course of these expeditions he made the discovery of the north magnetic pole in  $70^{\circ} 7' \text{ N.}$  and  $45^{\circ} 9' \text{ E.}$  In 1834 he attained the rank of captain, and in the following year commanded an expedition in search of several whalers which had been caught in the ice in Baffin's Bay.

From 1836 to 1838 Sir James Ross was employed by the Admiralty in the determination of the points of magnetic deviation and declination in Great Britain and Ireland—labours which have served as the basis upon which were founded the isodynamic lines in the charts published by General Sabine. In 1839 he took the command of a scientific expedition sent out, at the suggestion of the Royal Society, to explore the Antarctic regions. Three times did he endeavour to break through the icy barrier which surrounds the Antarctic pole, but in vain, as he was unable to advance beyond the latitude of  $78^{\circ} 10' \text{ S.}$ , a limit, however, which has not been since surpassed in that direction, and had not previously been reached.

In this voyage, also, was discovered the great Antarctic continent of Victoria Land, distinguished by the existence of a volcano 3800

feet in height. The voyage lasted four years, and was fertile in observations of all kinds, amongst which, not the least important are those of Sir James Ross himself in terrestrial magnetism and meteorology, &c. Its results were published by himself in 1847.

His last voyage to the Polar Seas was in 1848, when he went unsuccessfully in search of Sir John Franklin. He was knighted in 1844, and received the decoration of the Legion of Honour from Louis Philippe. He became a Fellow of this Society February 3, 1824; and died April 3, 1862, aged 62.

*Andrew Sinclair, M.D.*, was a surgeon in the Royal Navy. He entered the service about the year 1824, and was promoted to surgeon's rank in 1829. He was appointed surgeon of the surveying-expedition of H.M.S. 'Sulphur' on the Pacific coasts of North and South America, under the command, first, of Captain Beechey, and afterwards of Sir Edward Belcher, and has long been favourably known in botanical circles from the collections he then formed, and an account of which has been published, partly in the Supplement to Hooker and Arnott's 'Botany of Beechey's Voyage,' and partly in Bentham's 'Botany of the Voyage of the 'Sulphur.' In 1842 he was employed as surgeon of a convict-ship, and visited several Australian ports, collecting diligently everywhere. From Australia he went to New Zealand for the purpose of spending some weeks with the Antarctic Expedition, in which his friend Dr. Hooker was then doing the duty of Naturalist. During a second voyage to Australia in the same capacity, he met with Captain (now Admiral) Fitzroy, who was on his way to New Zealand as Governor, and who took Dr. Sinclair on with him as his private secretary.

Not long after his arrival he succeeded to the post of Colonial Secretary, which he retained during the governments of Captain Fitzroy, Sir George Grey, and Colonel Brown. During all this period his delight was in botany, to which his leisure was almost entirely devoted, although he still found time also to make considerable and valuable collections, more especially of Sponges and Zoophytes.

On the establishment of parliamentary government in New Zealand, Dr. Sinclair visited England, and soon after received a pension from the colony. But being still bent on the exploration of his favourite island, and being especially desirous to collect materials from the Middle and Southern Islands for a Supplement to Dr. Hooker's 'Flora,' he returned in 1859. After several months' sojourn in Auckland and in Nelson, he latterly repaired to Canterbury, and made arrangements with Mr. Haast for visiting Mount Cook, with

the intention of crossing the glacier-bound central range to the west coast—an arduous journey for a man at his age, but one of the most interesting, geographically, geologically, and botanically, that could be undertaken in New Zealand. From this he was destined never to return. The intelligence of his death was first received from his companion Dr. Haast, the geologist to the party, and afterwards, in more detail, from his old and attached friend and fellow-botanist, C. Knight, Esq., F.L.S., of Auckland. He was drowned in an imprudent attempt to cross the swollen Raugitata River on foot, at a ford where the stream is divided by an island. Dr. Sinclair appears to have crossed with his horse to the island; but the animal having there escaped from him, he proceeded on foot into the second branch, when, the current proving too strong, he was carried down; and the body was discovered, some time afterwards, lying on a spit of sand.

Thus was lost a valuable friend to science and a most amiable and excellent man. He was remarkable for shrewdness of character, ardent love of knowledge, readiness in communicating it, and as an assiduous collector of plants and animals. He made no pretensions to a knowledge of scientific subjects, though he read largely and often observed well. Of ancient and modern history and *belles lettres* he was extremely fond, and on these subjects his stores of information were both varied and great. He had a keen relish for society, great love of music and art, and was a most engaging companion in the bush or at sea, and to old or young in the drawing-room or school-room. He was never married; but many will mourn his loss, as that of a most judicious, disinterested, and warm-hearted friend; and his name will ever be prominent as one of the pioneers of botanical discovery on the Pacific coasts of America and in New Zealand, and as the active promoter of all branches of science in that colony.

*Joseph Sheldon Cradock Wilkinson, Esq., M.R.C.S.Eng.*, was a medical practitioner at Great Marlow, Bucks. He was elected into the Society on the 7th February, 1837, and died at the age of 52, on the 18th of June, 1861.

#### FOREIGN MEMBERS.

*Charles Louis Blume, M.D.*, was born at Leyden in the year 1796. He was educated for the medical profession, and, soon after taking his degree, proceeded to Java, where he had the principal medical charge of the colony, and, on the retirement of Reinwardt in 1823, was made Superintendent of the Botanic Garden at Buitenzorg. About the same time he was specially directed by the en-

lightened Governor, Baron van der Capellan, to inquire into the remedies in use among the natives, with a view to the introduction of such as might prove available into the European Pharmacopœias.

Having been thus induced to turn his attention more particularly towards botany, he soon became so entirely devoted to its pursuit, that all the time he could spare from his professional duties was occupied in the investigation of the plants of the country, of which, with the assistance of some European fellow-labourers and of native collectors, he amassed in a few years about 3000 species.

In the year 1824, while on a visit to Nusa Kambangan (a peculiarly unhealthy island on the south coast of Java), he lost nearly all his companions, and was himself brought to the point of death by a violent attack of fever, the frequent recurrence of which for some years afterwards very seriously affected his health. Nevertheless he worked continually at the publication of his botanical discoveries, commencing in 1823 with a Catalogue of the Botanic Garden at Buitenzorg, and several Memoirs in the 'Batavian Transactions,' and following these up with a far more important work under the title of 'Bijdragen tot de Flora van Nederlandsche Indie,' published at Batavia in seventeen fasciculi, during the years 1825 and 1826.

It may naturally be supposed that, with the small assistance from books which could be obtained at that time in Java, numerous errors would occur in the determination of the multitude of species described in this valuable work, many of which the author himself afterwards took occasion to correct. But the wonder is, that under such unfavourable circumstances so extensive a work could have been produced with no greater or graver errors. In the year 1826, his health still continuing to suffer greatly from periodical attacks of fever, he returned to Europe, and immediately commenced an 'Enumeratio Plantarum Javæ et Insularum adjacentium,' of which two fasciculi (the first containing the Ferns and allied orders) appeared in 1827 and 1828. In the latter year, having obtained a liberal allowance from the King of the Netherlands, he greatly enlarged his plan, and began the publication of a splendid work in folio, illustrated with coloured plates, entitled 'Flora Javæ et Insularum adjacentium,' of which forty fasciculi, containing many of the most important families, appeared during that and several subsequent years. On the suspension of this work, the author proceeded with another, on a nearly similar plan and, like the former, supported by royal munificence, under the name of 'Rumphia,' a title suggested by the designation given to him in 1818, on his election into the Academia Naturæ Curiosorum. Of

this work also forty fasciculi, forming four volumes, were published during the years 1834-1848. The last of this extensive series of works on the Flora of the Dutch possessions in India was commenced in 1849, under the title of 'Museum Botanicum Lugduno-Batavum,' and continued at intervals until 1856.

Numerous minor publications occupied the intervals of these greater labours, and serve to evince how indefatigably the author laboured in the pursuit of his favourite science.

He died, after a prolonged illness, on the 3rd of February in the present year, in the 66th year of his age.

After his return to Europe, he became Professor of Botany and Director of the Royal Botanic Garden at Leyden, and received several orders of knighthood from his own and other Sovereigns. He was elected a Foreign Member of the Linnean Society in 1833, and was also a Corresponding Member of the Botanical Section of the Academy of Sciences in the Institute of France.

In descriptive botany the name of Dr. Blume deservedly ranks high. In the early part of his career, his want of acquaintance with the literature of the science and with the great collections of Europe led him into the commission of numerous errors, as has been above said, in the identification of species, in the construction of genera, and in the reference of these genera to their proper position in the natural system. But these were necessary results of the circumstances under which he was placed, and of the rapidity with which he commenced the publication of his observations, before he had had the requisite opportunities for comparison; and they were gradually corrected as those opportunities were afforded. A tendency to the multiplication of species on insufficient grounds, which rather increased than diminished in his later years, may also be fairly objected to him; but it is his great merit to have done more than any other botanist since the days of his prototype for the elucidation of the flora of the great Malayan Archipelago, which constitutes the bulk of the Dutch possessions in Eastern Asia. Never was the prophetic application of a great name to one almost unknown in science more fully justified by the event, than when that of Rumphius was bestowed upon Professor Blume.

*Isidore Geoffroy St.-Hilaire*, son of Étienne Geoffroy, was born at Paris, on the 16th December, 1805, and died in the same city, on the 10th November, 1861.

Born, as it were, in the Museum, and bred in the menagerie founded by his illustrious father, and in the galleries filled by the labours of Cuvier and Lamarek, it is not to be wondered at that the son should



from the first have acquired a taste for zoological studies, for the pursuit of which he was placed in such advantageous circumstances and guided by such an able instructor.

Nor was he backward in taking advantage of his position. His first contribution to science was made in his nineteenth year, when he published the description of an American Bat (*Nyctinomus brasiliensis*); and at twenty-one he furnished the 'Dictionnaire Classique d'Histoire Naturelle' with an article, afterwards published in a separate form under the title of 'Considérations générales sur la Classe des Mammifères'—a work in which he thus early manifested the strong tendency of his mind to the generalization of facts, which he had doubtless acquired from his father's precepts and example.

From this time his contributions to science were numerous and varied; but it is unnecessary, perhaps, to notice any in particular, until we come to his first more important work, entitled 'Histoire générale et particulière des Anomalies de l'Organisation chez l'Homme et les Animaux; ou, Traité de Tératologie,' in three volumes, the first of which was published in 1832, and the last in 1836. The publication of this work, which may be regarded as an amplification and extended demonstration of the views respecting monstrosities entertained and already expressed by his father, led to the author's election, at the early age of twenty-seven, into the Academy, where he succeeded to the vacant seat of Latreille, in the section of Zoology, on the 15th April, 1833.

Previously to this, however, that is to say, in 1829, Isidore Geoffroy, then only twenty-four, had already commenced his career as a teacher, acting at first as an aid to his father, and selecting Ornithology as the subject of his lectures. In the following year he also delivered an interesting course of lectures at the "Athénée," having for their subject the fundamental relations of the species of animals *inter se* and towards the external world. In 1837 he was appointed his father's deputy at the Faculty of Sciences of Paris, a provisional chair which he shortly afterwards quitted to proceed to Bordeaux, where, under the title of "Dean," he undertook the organization of the Faculty of Sciences established in that city in 1838. Having fulfilled this mission, he returned to Paris, and was named Inspector of the Academy; and he also discharged the functions of Inspector-General of the University in 1840, although the title itself does not appear to have been actually bestowed upon him before 1844. These offices he continued to occupy until he succeeded M. de Blainville in the Zoological chair at the Faculty of Sciences in 1850. In addition, however, to the responsible duties of his inspectorial office, he had

also to supply the place in the Muséum, which had been so admirably filled by his father, who, like his fellow-labourers, Savigny and Lamarck, was about this time afflicted with the loss of sight. In 1841 this temporary position was rendered permanent, the disabled veteran in science yielding place to the young soldier he had so carefully reared; and Isidore Geoffroy, named Professor of Mammalogy at the Muséum, received during his father's life an inheritance worthily merited by the way in which he had long vicariously discharged the duties of the office. In fact, since 1824, he had performed the duties of "Aide Naturaliste" in the Jardin des Plantes, and in this capacity had under his superintendence and direction not only the collection of stuffed mammals and birds in the Muséum, but also the menagerie of living animals first brought together by Étienne Geoffroy in 1793. The zeal and industry displayed by him in the latter capacity may be judged of from the fact that in 1824 the collection included not more than 283 birds and mammals, whilst between 1850 and 1861 their number amounted on the average to about 900.

It was here also that he began to devote considerable attention to a branch of what may be termed applied zoology, in which, during the whole of his career, he continued to take the warmest interest, viz. the acclimatization of animals which may be useful to man either as food or as ministers otherwise to his wants or pleasures.

In pursuance of this object, he, in concert with several other men of science and of business, was mainly instrumental in the formation of the Imperial Zoological Society of Acclimatization, and in the establishment of the gardens belonging to that Society in the Bois de Boulogne, acting also as President of the Society from 1855 to his death.

In 1845 he received the decoration of the Legion of Honour; and he was elected a Foreign Member of our body in 1861.

Among his numerous contributions to zoological science, most of which have appeared in various periodicals, may be enumerated, besides those already mentioned, his 'Essais de Zoologie générale, ou Mémoires et Notices,' 'l'Anthropologie et l'Histoire de la Science,' 1840; 'Histoire Naturelle des Insectes et des Mollusques,' 1841; 'Vie, Travaux, et Doctrine Scientifique d'Étienne Geoffroy St.-Hilaire,' 1847; 'Catalogue Méthodique du Muséum d'Histoire Naturelle,' 1850-51; 'Essai sur la Domestication et la Naturalisation des Animaux utiles,' 1854; and, lastly, his 'Histoire Naturelle générale des Règnes organiques, principalement étudiée chez l'Homme,' 1854-55, an undertaking perhaps of too great a scope for any

individual to perform satisfactorily, and of which, at any rate, he lived to complete but a small part in three volumes. He had also been associated with M. Brongniart and other naturalists in an 'Account of the Natural History of the Voyage of the 'Vénus,' under the command of Dupetit Thouars.

*Friedrich Tiedemann*, one of the oldest and most illustrious of European anatomists and physiologists, was born at Cassel, on the 23rd of August, 1781.

His father was a literary man of considerable eminence, who at that time occupied the post of tutor in the Carolinian College, and, when his son was five years old, was appointed to the chair of Philosophy in the University of Marburg. Under his father's teaching, Tiedemann's education rapidly advanced, and he acquired more particularly an excellent knowledge of the classical languages, which he retained, and from which he derived vivid enjoyment, throughout his life.

He very soon, however, exhibited a strong taste for natural-history studies, in which he was much encouraged by Dr. Mönch, the Professor of Botany and Chemistry. At a very early period of his life he began to dissect small animals; and he was often in the habit of relating the joy he experienced, when eight years old, on discovering the relations of the œsophagus and trachea to the stomach and lungs respectively. This taste continuing to animate him as years went on, he had, at 15, made a considerable collection of the skulls and skeletons of animals; and at the end of his preliminary studies he devoted himself finally to zoology and medicine. Of these sciences, however, there were at that time no efficient teachers in Marburg, and Tiedemann was driven to depend upon books and his own researches for all the knowledge he could there acquire. But in 1802 he proceeded to Bamberg, in order to study Medicine more methodically under Professor Marcus, and afterwards to Würzburg, where he attended the practice of Thomann and Casper v. Siebold in the Julius Hospital.

Returning to Marburg in the spring of 1803, he had the misfortune to lose his father; and it would appear that the disappointment he experienced on finding that his professional cares were all in vain in his father's case caused him to take a distaste to the practice of medicine, and consequently to devote himself exclusively to the pursuit of zoology and physiology.

In the same year, at the instigation of Professor Brühl, he began to give private instruction in anatomy, physiology, and zoology to

the students of the University; and in the summer of 1804 he delivered his first course of lectures on physiology, comparative osteology, and the cranioscopy of Dr. Gall.

Finding, however, that his own knowledge was still very defective, he again repaired, in the autumn, to Würzburg, where, under Hesselbach, he occupied himself principally in the dissection of the nervous system, attending at the same time Schelling's Lectures on *Natur-Philosophie*, in which for a short time he hoped to find some new basis for Natural History, and more especially for Medicine. But inquiries of this transcendental nature seem always to have been foreign to his eminently practical and realistic mind, and thirty years afterwards he describes the only effect upon him of Schelling's lucubrations in these words:—"By his brilliant but fantastic views of the physical world, that great philosopher had himself removed from me all temptation to abandon the road of empirical research and observation."

Inspired by an ardent desire to enter on this road, he determined to proceed to Paris to consult the great collections there, and to benefit by the teaching of the great men under whom they were placed.

In Paris, Tiedemann laboured assiduously in the *Jardin des Plantes* and the *Muséum*, and attended the lectures of Cuvier, Étienne Geoffroy St.-Hilaire, Lamarck, Duméril, and Haüy.

But he was recalled from Paris sooner than he had intended. In 1805, on the recommendation of Scëmmering, he was appointed Professor of Zoology and Anatomy in the University of Landshut, at the early age of 25. Here he found abundant occupation; for, although he was installed in a new and beautiful anatomical theatre, it was totally unprovided with preparations of any kind. He found nothing in this way but a chest of bones and an Egyptian mummy; nor had he, moreover, any help in the supplying of these deficiencies, having first even to instruct his prosector in the art of dissection. Thanks to Napoleon, however, there were at that time plenty of subjects to be had at Landshut, which was occupied alternately by French, Bavarian, or Austrian troops, from whom the Anatomical Professor, at any rate, was furnished with abundant supplies of bodies, amounting probably on occasion to a superfluity, as after the battle of Austerlitz, in which 15,000 Russian prisoners were taken, very many of whom died on their transit through the town. Earnestly occupied in his work, and surrounded with a circle of scientific friends, his life passed usefully along, and in 1807 he married at Ratisbon

a lady distinguished as well by her intellectual as her personal gifts, by whom he had four sons and three daughters, only two of the former and one of the latter, however, surviving him.

In 1816 Professor Tiedemann quitted Landshut, where he had previously lost several of his more eminent colleagues, either by death or removal, for the wider sphere of the University of Heidelberg, where he again found himself the centre of a phalanx of young and active coadjutors. Here he remained, the chief ornament of the University, for thirty years, during which he formed, principally with his own hands, a magnificent collection of anatomical and physiological preparations, and attracted to his lectures crowds of students from all parts of Europe, who, drawn to him at first by his great reputation as a teacher, remained ever afterwards attached to him with an affectionate personal regard.

He continued thus occupied incessantly and zealously in the duties of his chair for nearly fifty years, when, partly broken down by the loss of a son, who fell in the political disturbances which arose in the Grand Duchy of Baden in 1848, and also by his increasing blindness, he retired in 1849 to Frankfort, though he nevertheless continued to occupy himself with physiological pursuits, and it was here that he prepared his last work, 'On the History of Tobacco, and its Effects,' in the course of which he made numerous and interesting experiments on the influence of Nicotine.

On the 10th of March, 1854 (the year in which this work was published), his numerous friends, admirers, and pupils celebrated, *more Teutonico*, the fiftieth anniversary of his Doctorate; and on this occasion a very fine commemorative medal was struck in his honour.

In the spring of 1855 the cataracts in his eyes had made such progress that his sight was almost destroyed, and he was unable to read or write, or even to go about alone. He consequently repaired to Heidelberg, where, under the skilful hands of Chelius, a highly successful operation restored vision to one who knew so well how to employ it, and whose chief delight was in the contemplation of nature.

In 1856 Tiedemann followed his son-in-law, Professor Bischoff, to Munich, in which city his and his wife's golden wedding-day was celebrated by his friends and relations on the 30th of March, 1857, and here he died on the 22nd of January, 1862.

I can refer but briefly to Professor Tiedemann's published works, and notice only the more important among them.

In 1808 appeared the first volume of his 'Zoology,' containing the natural history of Man and the Mammalia, in which he endeavoured

to combine the natural history of the animals with their anatomy, and to found upon the latter a new system of classification. The second volume of this work was not published till 1810-14, and is occupied with the anatomy and physiology of Birds. In 1813 appeared the 'Anatomy of Acephalous Monsters;' and in 1816 his great work on the 'Anatomy and Development of the Fœtal Human Brain, together with comparative exposition of the structure of the Brain in Animals'—a classical work, distinguished, like all from his pen, by the care, accuracy, and comprehensiveness of the observations contained in it. Notwithstanding the additions which, since that time our knowledge of the earliest development of the brain has received from embryology, Tiedemann's researches have lost none of their value, and all subsequent inquirers have recognized the accuracy and admired the abundance of his facts. In 1817 he published a Monograph on the 'Anatomy and Natural History of the Crocodile,' which was commenced as an introduction to a general anatomy and natural history of the Reptilia, in conjunction with Oppel of Munich and Dr. Liboschitz; but this design, owing to the death of his coadjutors, was afterwards abandoned.

In the list of ASSOCIATES we have to deplore the loss of

*James Forbes*, who was elected on the 17th January, 1832, and died at the age of 68, on the 6th of July, 1861. He was born at Bridgend, in Perthshire, in May 1773, and commenced life as gardener at Dupplin Castle, in the same county. He was afterwards in the Marquis of Ailsea's service, in the same capacity, at Culzean Castle, in Ayrshire, whence he went to Ireland, where he lived some years with Lord Hartland as steward and gardener. From thence he went to the Botanic Garden, Dublin, under Dr. Mackay; and from this situation he was appointed head gardener to the Duke of Bedford, who required a good botanist and one capable of forming the extensive gardens at Woburn Abbey, at which place he lived thirty-seven years.

He was an excellent practical gardener, and no mean botanist; and it is mainly, I believe, to him that we owe the 'Salicetum' and 'Pinetum Woburnense,' works, however, in which he was assisted in some degree by Mr. Don, formerly Librarian to this Society. The estimation in which Mr. Forbes's labours on this occasion were held by botanists may be judged of by the following extracts from Hooker's 'British Flora,' in which, after speaking of the aid he received on the subject of Willows from Mr. Borrer, the author proceeds to say, "But the richest collection of living willows is unquestionably that

at Woburn Abbey, which has given rise to a splendid work, the 'Salicetum Woburnense,' in which we have a standard set of figures of all our native, amongst many exotic, species, which give to the British naturalist an advantage over all that Continental authors have published on the subject; and to them I refer in every instance, and with great satisfaction. The arrangement of the species in the 'Salicetum' is due to the botanical skill and knowledge of Mr. Forbes, head gardener at Woburn; and that department does him great credit."

*James Townsend Mackay, LL.D., M.R.I.A.*, was elected an Associate so long ago as December 2, 1806. He died February 25th 1862, aged 86.

He was born at Kircaldy, Fifeshire, where he received the ordinary education afforded at parochial schools. He was bred to the occupation of a gardener, and held a situation in Scotland in that capacity before he went to Ireland in 1803. At that time the authorities of Trinity College, Dublin, had determined upon the formation of a botanical garden to aid the lectures of the Professor of Botany, a chair then held by Dr. Scott. To this gentleman Dr. Mackay was recommended as a suitable person to lay out the gardens, which he did soon afterwards, on his being appointed curator, a situation which he held from 1806 to 1862.

In the years 1804 and 1805, Dr. Mackay made tours through the western parts, more especially, of Ireland, for the purpose of observing the indigenous plants, which at that period were but imperfectly known. The results of these journeyings were published in a catalogue of the rarer plants of Ireland, in 1806, in the fifth volume of the 'Transactions of the Royal Dublin Society.' And on a subsequent occasion, when better acquainted with the indigenous flora, he gave for publication, to the Royal Irish Academy (of which learned body he was then a member), a catalogue of all the phænogamous plants and ferns known to him as native. These contributions, however, were but preparatory to his principal work, namely the 'Flora Hibernica,' published in 1836. In this work he edited only the phænogamous plants, Dr. Taylor and Dr. Harvey undertaking the Cryptogamia.

These, with one or two short papers communicated to the British Association, are, I believe, his only contributions to botanical science.

In 1850 the Board and Fellows of Trinity College, Dublin, conferred on him the title of LL.D.

The Secretary also announced that twenty-five Fellows, three Foreign Members, and one Associate had been elected since the last Anniversary.

At the Election which subsequently took place, George Bentham, Esq., was re-elected President; William Wilson Saunders, Esq., Treasurer; and George Busk, Esq. and Frederick Currey, Esq., Secretaries. The following five Fellows were elected into the Council, in the room of others going out: viz., Beriah Botfield, Esq., M. P.; Henry Christy, Esq.; J. E. Gray, Ph.D.; John Lubbock, Esq.; and R. C. A. Prior, M.D.

Mr. W. F. Saunders, on the part of the Auditors of the Treasurer's Accounts, read the Balance Sheet, by which it appeared that the total Receipts during the past year, including a Balance of £445 2s. 5*d.* carried from the preceding year, amounted to £1817 15s. 11*d.*, and that the total Expenditure during the same period (including the purchase of £200 Consols) amounted to £1144 2s. 9*d.*, leaving a Balance in the hands of the Bankers of £673 13s. 2*d.*

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June 5th, 1862.

George Bentham, Esq., President, in the Chair.

Frederic Francis Hallett, Esq., and William Henry Kirton, Esq., were elected Fellows.

The President nominated Thomas Bell, Esq., J. J. Bennett, Esq., J. D. Hooker, M.D., and W. W. Saunders, Esq., Vice-Presidents for the ensuing year.

The following Papers were read, viz.:—

1. "Observations on the Gonidia and Confervoid Filaments of Mosses, and on the relation of their Gonidia to those of Lichens and of certain Freshwater *Algæ*;" by J. B. Hicks, M.D., F.R.S. & L.S. (See 'Transactions,' vol. xxiii. Part 3.)

2. Letter from Mr. Gustav Mann to Sir W. J. Hooker, dated February 27th, 1862, and giving an account of his ascent of the Cameroon Mountains. Communicated by Sir William Hooker, K.H., F.R.S. & L.S.

3. "On the Vegetation of the Cameroons;" by J. D. Hooker, M.D., F.R.S. & L.S.



4. "Enumeration of the Species of *Acanthaceæ* from the continent of Africa and the adjacent Islands;" by Thomas Anderson, M.D., F.L.S. (See 'Botanical Proceedings,' vol. vii.)

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June 19th, 1862.

George Bentham, Esq., President, in the Chair.

The Rev. William Willox Peete was elected a Fellow.

Mr. Christy, F.L.S., exhibited specimens of the *Axolotl*, from Mexico, and of the *Proteus anguinus*, from the caves at Adelsberg.

Dr. Hooker, V.P.L.S., exhibited young individuals of *Welwitschia mirabilis*, showing the early stage of the leaves, while still entire.

The following Papers were read, viz. :—

1. "Observations on the Choice of Food in the Cod and Ling;" by William Laughrin, A.L.S. (See 'Zoological Proceedings,' vol. vi.)

2. "On the Specific Identity of the described Forms of *Tanalia*;" by Henry F. Blanford, Esq. Communicated by J. D. Hooker, Esq., M.D., F.R. & L.S. (See 'Transactions,' vol. xxiii. Part 3.)

3. "Notes on the *Thysanura*," Part 2; by John Lubbock, Esq., F.R.S., F.L.S. (See 'Transactions,' vol. xxiii. Part 3.)

*Receipts and Payments of the Linnean Society from May 1, 1861, to April 30, 1862.*

|                                                         | £     | s.    | d.    |
|---------------------------------------------------------|-------|-------|-------|
| Balance in the hands of the Bankers at last audit ..... | 445   | 2     | 5     |
| Admission Fees .....                                    | 156   | 0     | 0     |
| Compositions .....                                      | 417   | 0     | 0     |
| Annual Contributions of £2 2s. ....                     | 48    | 6     | 0     |
| Do. do. ....                                            | 470   | 12    | 0     |
| Transactions and Journal sold .....                     | 266   | 6     | 8     |
| Dividends on Consols .....                              | 14    | 8     | 10    |
|                                                         | <hr/> | <hr/> | <hr/> |
|                                                         | £1817 | 15    | 11    |

|                                                                         | £     | s.    | d.    |
|-------------------------------------------------------------------------|-------|-------|-------|
| Insurance .....                                                         | 15    | 2     | 0     |
| Repairs and Furniture .....                                             | 20    | 1     | 7     |
| Coals, Gas, Tea, Postage, &c. ....                                      | 85    | 14    | 3     |
| Salaries .....                                                          | 195   | 0     | 0     |
| Printing, Engraving, and Colouring .....                                | 539   | 5     | 6     |
| Books purchased .....                                                   | 62    | 8     | 1     |
| Bookbinding and Stationery .....                                        | 26    | 3     | 1     |
| Commission on Transactions, &c. sold, and Contributions collected ..... | 16    | 13    | 3     |
| Purchase of £200 Consols .....                                          | 183   | 15    | 0     |
| Balance in the hands of the Bankers .....                               | 673   | 13    | 2     |
|                                                                         | <hr/> | <hr/> | <hr/> |
|                                                                         | £1817 | 15    | 11    |

W. WILSON SAUNDERS, *Treasurer.*

The foregoing Accounts have been examined, and the Balance in hand found to be correctly stated at £673 13s. 2d.

GEORGE BENTHAM, *President.*  
FREDERICK CURREY,  
LOVELL REEVE,  
DANIEL HANBURY,

May 20, 1862.

W. F. SAUNDERS,  
GEORGE BUSK,  
DANIEL OLIVER.

# ADDITIONS

TO THE

## LIBRARY OF THE LINNEAN SOCIETY.

RECEIVED FROM JULY 1, 1860, TO DECEMBER 31, 1861.

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[Continued from Vol. V. page lv.]

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### TITLES.

### DONORS.

#### ACADEMIES and SOCIETIES.

##### Amsterdam :—

Kon. Akademie van Wetenschappen.

Verslagen en Mededeelingen. Afdeeling Natuurkunde, deel 10. 8vo. Amsterdam, 1860.

— — — Afd. Letterkunde, deel 5. 8vo. *Ib.* 1860.

Jaarboek voor 1859. 8vo. *Ib.* 1860.

Catalogus van de Boekerij der Akademie, deel 1, stuk 2. 8vo. *Ib.* 1860.

Verslag over den Paalworm. 8vo. *Ib.* 1860.

THE ACADEMY.

Kon. Zoologisch Genootschap 'Natura Artis Magistra.'

Bijdragen tot de Dierkunde, deel 1 (Afl. 1-6). 4to. Amsterdam, 1848-54.

THE SOCIETY.

Arkansas :—First and Second Reports of a Geological Reconnoissance of the Northern, Middle, and Southern Counties of the State, made during the Years 1857-60, by D. D. Owen, &c. 8vo. Little Rock (Arkansas) and Philadelphia, 1858-60.

THE STATE OF ARKANSAS.

Basel :—Naturforschende Gesellschaft. Verhandlungen, Theil 2, Heft 4. 8vo. Basel, 1860.

THE SOCIETY.

- |                                               | TITLES.                                                                                                                                                                                            | DONORS.                        |
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| ACADEMIES and SOCIETIES ( <i>continued</i> ). |                                                                                                                                                                                                    |                                |
| Batavia :—                                    | Natuurkundige Vereeniging in Nederlandsch Indie<br>(=Societas Scientiarum Indo-Neerlandicæ).                                                                                                       |                                |
|                                               | Natuurkundig Tijdschrift: onder redactie van P. Bleeker.<br>4 <sup>de</sup> Serie, deel 6 (Afl. 1-6). 8vo. Batavia, 1859-60.                                                                       | THE ASSOCIATION.               |
| Berlin :—                                     | Entomologischer Verein. Berliner Entomologische Zeitschrift.<br>Jahrgang 2, 3 Heft 1-3, & 4. 8vo. Berlin, 1858-60.                                                                                 | W. W. SAUNDERS, Esq., V.P.L.S. |
|                                               | Königl. Akademie der Wissenschaften.<br>Abhandlungen, aus den Jahren 1859 & 1860. 4to. Berlin,<br>1860-61.                                                                                         |                                |
|                                               | Monatsbericht, aus den J. 1860 & 1861. 8vo. <i>Ib.</i> 1861-62.                                                                                                                                    |                                |
|                                               | — Register, vom J. 1836-58. 8vo. <i>Ib.</i> 1860.                                                                                                                                                  | THE ACADEMY.                   |
|                                               | Verein zur Beförderung des Gartenbaues in den K. Preussischen Staaten.<br>Verhandlungen, Band 20, Heft 2. 4to. Berlin, 1851.                                                                       |                                |
|                                               | — Neue Reihe, Jahrg. 3; 6 Heft 3, und 7 Heft 1 & 2. 8vo.<br><i>Ib.</i> 1855-60.                                                                                                                    |                                |
|                                               | Wochenschrift: redigirt von den General-Sekretair des Vereines, Prof. Dr. Karl Koch. Jahrgang 1, nos. 1-33; Jahrg. 3, nos. 34-52; und Jahrg. 4, nos. 1-8, und nos. 22-48. 4to. <i>Ib.</i> 1860-61. | THE SOCIETY.                   |
| Berwick :—                                    | Berwickshire Naturalists' Club. Proceedings,<br>vol. 4, no. 4. 8vo. 1860.                                                                                                                          | THE CLUB.                      |
| Bombay :—                                     | Government Observatory. Magnetical and Meteorological Observations made at, in the year 1858. 4to. Bombay, 1859.                                                                                   | HER MAJESTY'S GOVERNMENT.      |
| Bonn :—                                       | Naturhistorischer Verein der Preussischen Rheinlande, &c. Verhandlungen, Jahrgang 17. 8vo. Bonn, 1860.                                                                                             | THE ASSOCIATION.               |
| Boston :—                                     | American Academy of Arts and Sciences.<br>Memoirs, new series, vol. 6, pt. 2, and vol. 7. 4to. Cambridge and Boston, 1858-60.                                                                      |                                |
|                                               | Proceedings, vol. 4, sheets 12-57, and vol. 5, sheets 1-30. 8vo. <i>Ib.</i> 1860.                                                                                                                  | THE ACADEMY.                   |

TITLES.

DONORS.

ACADEMIES and SOCIETIES (*continued*).

Boston (*continued*) :—

Society of Natural History.

Journal, vol. 7, no. 1. 8vo. Boston, 1859.

Proceedings, vol. 6, sheets 23–28 ; vol. 7, sheets 1–25, 27, 28, and title ; and vol. 8, sheets 1–4. 8vo. *Ib.* 1858–61.

THE SOCIETY.

Brussels :—Académie R. des Sciences de Belgique.

Mémoires, tome 32. 4to. Bruxelles, 1861.

Mémoires couronnés, &c. Collection in 8vo, tome 10. *Ib.* 1860.

Bulletins. 2<sup>e</sup> série, tomes 9 & 10. 8vo. *Ib.* 1860.

Annuaire. 27<sup>e</sup> année. 12mo. *Ib.* 1861. THE ACADEMY.

Observations des Phénomènes périodiques (an 1859). 4to.

Phénomènes périodiques ; Magnétisme, Astronomie. 8vo.

Sur les Phénomènes Périodiques des Plantes et des Animaux. 8vo.

Sur le Congrès International de Statistique, tenu à Londres en 1860. 4to. THE AUTHOR, M. AD. QUÉTELET.

Calcutta :—Asiatic Society. Journal, vols. 29 & 30. 8vo.

Calcutta, 1860–61. THE SOCIETY.

Canada :—Geological Survey of. Report of Progress for the year 1858. 8vo. Montreal, 1859. SIR W. E. LOGAN ?

— :—v. *Kingston and Montreal.*

Cherbourg :—Société Imp. des Sciences Naturelles. Mémoires, tomes 6 & 7. 8vo. Paris, 1859–60. THE SOCIETY.

Christiania :—Kong. Norske Frederiks Universitet. Stiftelse fremstillet i Anledning af dets Halvhundredaarsfest ; af M. J. Monrad. 8vo. Christiania, 1861. THE UNIVERSITY.

Copenhagen :—K. Danske Videnskabernes Selskab. Oversigt i aar. 1859. 8vo. Kjöbenhavn. THE SOCIETY.

Dublin :—

Geological Society. Journal, vol. 8, part 3. 8vo. Dublin, 1860. THE SOCIETY.

Royal Dublin Society. Journal, nos. 1–8, & 16–19. 8vo. Dublin, 1856–60. THE SOCIETY.

Royal Irish Academy. Transactions, vol. 24, part 1. Science. 4to. Dublin, 1860. THE ACADEMY.

University Zoological and Botanical Association. Proceedings, vol. 1, part 3, and vol. 2, part 1. 8vo. Dublin, 1859–60.

THE ASSOCIATION.

|                                               | TITLES.                                                                                                                         | DONORS.      |
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| ACADEMIES and SOCIETIES ( <i>continued</i> ). |                                                                                                                                 |              |
| Edinburgh :—                                  |                                                                                                                                 |              |
|                                               | Botanical Society. Transactions, vol. 6, pt. 3, and vol. 7, pt. 1. 8vo. Edinburgh, 1860-61.                                     | THE SOCIETY. |
|                                               | Royal Society.                                                                                                                  |              |
|                                               | Transactions, vol. 22, part 2. 4to. (Edinburgh, 1860.)                                                                          |              |
|                                               | —, Supplement to vol. 22, part 2. (Append. to Makers-toun Magnet. &c. Observations). 4to. <i>Ib.</i> 1860.                      |              |
|                                               | Proceedings, vol. 4, nos. 50-52. 8vo. ( <i>Ib.</i> 1860.)                                                                       | THE SOCIETY. |
|                                               | Royal Physical Society. Proceedings, vol. 1. 8vo. Edinburgh, 1858.                                                              | THE SOCIETY. |
|                                               | Frankfort-a.-M. :—Senckenbergische Naturforschende Gesellschaft. Abhandlungen, Band 3, Lief. 2. 4to. Frankfurt-a.-M., 1861.     | THE SOCIETY. |
|                                               | Geneva :—Société de Physique et d'Histoire Naturelle. Mémoires, tome 15, partie 2, and tome 16, partie 1. 4to. Genève, 1860-61. | THE SOCIETY. |
|                                               | Giessen :—Oberhessische Gesellschaft für Natur- und Heilkunde. Bericht 8. 8vo. Giessen, 1860.                                   | THE SOCIETY. |
|                                               | Göttingen :—K. Gesellschaft der Wissenschaften. Abhandlungen, Band 9. 4to. Göttingen, 1861.                                     |              |
|                                               | Nachrichten, vom J. 1860. 12mo. <i>Ib.</i>                                                                                      | THE SOCIETY. |
|                                               | Halifax, Nova Scotia :—Literary and Scientific Society. Transactions, from Jan. 4 to Dec. 3, 1859. 8vo. Halifax, N. S., 1859.   | THE SOCIETY. |
|                                               | Jena :—Academia Cæs. Naturæ Curiosorum. Nova Acta, tomus 28. 4to. Jenæ, 1861.                                                   | THE ACADEMY. |
|                                               | Kingston, Canada West :—Botanical Society. Annals, vol. 1, parts 1 & 2. 4to. Kingston, C. W., 1861.                             | THE SOCIETY. |
|                                               | Königsberg :—K. Physikalisch-ökonomische Gesellschaft. Schriften, Jahrgang 1, Abth. 1 & 2. 4to. Königsberg, 1860-61.            | THE SOCIETY. |
|                                               | Lausanne :—Société Vaudoise des Sciences Naturelles. Bulletin, tome 6, no. 47. 8vo. Lausanne, 1860.                             | THE SOCIETY. |
|                                               | Leeds :—Philosophical and Literary Society. Annual Reports (40 & 41) for 1859-60 and 1860-61. 8vo. Leeds, 1860-61.              | THE SOCIETY. |

## TITLES.

## DONORS.

ACADEMIES and SOCIETIES (*continued*).

Leyden:—Nederlandsche Entomologische Vereeniging. Tijdschrift voor Entomologie; onder redactie van Prof. J. van der Hœven, &c. Deel 3, stuk 4-6, and deel 4, stuk 1-4. 8vo. Leyden, 1860. THE ASSOCIATION.

Liège:—Société R. des Sciences. Mémoires, tomes 15 & 16. 8vo. Liège, 1860-61. THE SOCIETY.

Liverpool:—Literary and Philosophical Society. Proceedings, nos. 14 & 15. 8vo. Liverpool, 1860-61. THE SOCIETY.

London:—

Art-Union.

Reports of the Council for the years 1860 & 1861, and Lists of Members. 8vo. London, 1860-61.

Almanacs for 1861 and 1862. *Ib.* 1860-61.

THE ART-UNION.

British Association for the Advancement of Science. Report of the 30th Meeting. 8vo. London, 1861.

THE ASSOCIATION.

Entomological Society. Transactions, New Series, vol. 5, pts. 3-5. 8vo. London, 1859-60. THE SOCIETY.

Geological Society.

Quarterly Journal, vol. 16, pts. 3 & 4, and vol. 17, pts. 1-4. 8vo. London, 1860-61.

List of the Members, September 1st, 1860. 8vo.

THE SOCIETY.

Geological Survey of Great Britain. Memoirs. Mining Records, &c. for 1858-60. 8vo. London.

THE SURVEY.

Horticultural Society.

Proceedings, vol. 1, nos. 14-31. 8vo. London, 1860-61.

List of Members, August 1860. 8vo. *Ib.* THE SOCIETY.

Microscopical Society:—v. *Journals*.

Palæontographical Society. Publications of, 2 vols. 4to, containing—

Bell (T.) Monograph of the Fossil Malacostracous Crustacea of Great Britain, part 1. 4to. London, 1857.

Davidson (T.) Monograph of British Permian Brachiopoda, part 4. 4to. *Ib.* 1857.

— Monograph of British Carboniferous Brachiopoda, part 5. 4to. *Ib.* 1857.

- | TITLES.                                                                                                                    | DONORS.                |
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| London ( <i>continued</i> ) :—                                                                                             |                        |
| Palæontographical Society ( <i>continued</i> ).                                                                            |                        |
| Edwards (F. E.) Monograph of the Eocene Mollusca, part 3, no. 2. 4to. London, 1856.                                        |                        |
| Jones (T. R.) Monograph of the Tertiary Entomostraca of England. 4to. <i>Ib.</i> 1856.                                     |                        |
| Owen (R.) Monograph of the Fossil Reptilia of the Wealden Formation, parts 3 & 4. 4to. <i>Ib.</i> 1856–57.                 |                        |
| Sharpe (D.) Fossil Remains of Mollusca found in the Chalk of England, part 3. 4to. <i>Ib.</i> 1856.                        |                        |
| Wood (S. V.) Monograph of the Crag Mollusca, vol. 2. <i>Bivalves</i> . 4to. <i>Ib.</i> 1850–56.                            |                        |
| Wright (T.) Monograph of the British Fossil Echinodermata of the Oolitic Formations, parts 1 & 2. 4to. <i>Ib.</i> 1855–56. |                        |
| EXECUTORS OF THE LATE J. D. SALMON, Esq., F.L.S.                                                                           |                        |
| Pharmaceutical Society. Journal, 2nd series, vol. 2, and vol. 3, nos. 1–6. 8vo. London, 1860–61.                           | THE SOCIETY.           |
| Ray Society.                                                                                                               |                        |
| Reports on the Progress of Zoology and Botany for 1841–42, and 1843–44. 8vo. London, 1845–47.                              |                        |
| Botanical and Physiological Memoirs: edited by Arthur Henfrey, F.R.S., F.L.S. 8vo. London, 1853.                           |                        |
|                                                                                                                            | R. KIPPIST, Libr. L.S. |
| Royal Society.                                                                                                             |                        |
| Philosophical Transactions, vol. 150, parts 1 & 2. 4to. London, 1860–61.                                                   |                        |
| Proceedings, nos. 39–46. 8vo. <i>Ib.</i> 1860–61.                                                                          | THE SOCIETY.           |
| Royal Agricultural Society. Journal, vol. 21, pts. 1 & 2, and vol. 22, pt. 1. 8vo. London, 1860–61.                        | THE SOCIETY.           |
| Royal Asiatic Society. Journal, vol. 18, pts. 1 & 2, and vol. 19, pts. 1 & 2. 8vo. London, 1860–61.                        | THE SOCIETY.           |
| Royal Astronomical Society. Memoirs, vols. 28 & 29. 4to. London, 1860–61.                                                  | THE SOCIETY.           |
| Royal College of Physicians. List of Fellows, Members, &c. 8vo. London, 1860.                                              | THE COLLEGE.           |
| Royal Geographical Society.                                                                                                |                        |
| Journal, vols. 29 & 30. 8vo. London, 1859–60.                                                                              |                        |
| Proceedings, vol. 4, nos. 3–5, and vol. 5, nos. 1–5. 8vo. <i>Ib.</i> 1860–61.                                              | THE SOCIETY.           |



## TITLES.

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ACADEMIES and SOCIETIES (*continued*).London (*continued*):—

## Royal Institution.

Notices of the Proceedings, parts 10 & 11. 8vo. London, 1860–61.

Additions to the Library, nos. 3 & 4. 8vo.

Lists of the Members; and Report of the Visitors for 1859 & 1860. 8vo. London, 1860–61. THE INSTITUTION.

## Royal Medical and Chirurgical Society.

Transactions, vols. 43 & 44. 8vo. London, 1860–61.

Proceedings, vol. 3. nos. 4–6. 8vo. *Ib.* 1860–61.

THE SOCIETY.

Society of Arts. Journal, nos. 396–477. 8vo. London, 1860–61. THE SOCIETY.

## Wernerian Club.

Pliny's Natural History: a translation on the basis of that by Dr. P. Holland, vols. 1, 2, & 3, parts 1–5. 8vo. London, 1847–49.

Ray (J.) The Wisdom of God manifested in the Works of the Creation (parts 1–4). 8vo. *Ib.* 1845–47.

— Miscellaneous Discourses concerning the Dissolution and Changes of the World (parts 1–5). 8vo. *Ib.* 1850.

Werner (A. G.) Treatise on the external Characters of Minerals (parts 1–3). *Ib.* 1849–50.

EXECUTORS OF THE LATE J. D. SALMON, Esq., F.L.S.

## Zoological Society.

Transactions, vol. 4, pt. 7, sect. 1. 4to. London, 1861.

Proceedings, with Illustrations, parts 1–3 for 1860, and part 1 for 1861. 8vo. *Ib.* 1861. THE SOCIETY.

## Lyon:—

Académie Imp. des Sciences, &c. Mémoires, Nouvelle Série.

Classe des Sciences, tome 8. 4to. Lyon, 1858, et Classe des Lettres, tomes 7 & 8. 4to. *Ib.* 1858–60.

THE ACADEMY.

Société Imp. d'Agriculture. Annales des Sciences Physiques et Naturelles, &c., 3<sup>e</sup> Série, tomes 2 & 3. 4to, Lyon, 1858–59. THE SOCIETY.

Société Linnéenne. Annales, Nouvelle Série, tomes 5 & 6. 4to. Lyon, 1858–60. THE SOCIETY.

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| Madras:—Literary Society. Madras Journal of Literature and Science. New Ser. vol. 5, no. 10, and vol. 6, no. 11. 8vo. Madras, 1859–61. | THE SOCIETY. |
| Manchester:—Field Naturalists' Society. Report of the Committee for the year 1860. 8vo. London, 1861.                                  | THE SOCIETY. |
| Mauritius:—Royal Society of Arts and Sciences. Transactions, New Series, vol. 1, pt. 2. 8vo. Mauritius, 1860.                          | THE SOCIETY. |
| Montreal:—Natural History Society. Canadian Naturalist and Geologist, vol. 6, nos. 1–5. 8vo. Montreal, 1861.                           | THE SOCIETY. |
| Moscow:—Société Imp. des Naturalistes.                                                                                                 |              |
| Nouveaux Mémoires, tomes 11, 12, & 13, livr. 1 & 2. 4to. Moscou, 1859–61.                                                              |              |
| Bulletin, tome 32, nos. 2, 3 & 4, and tome 33, nos. 1–4. 8vo. <i>Ib.</i> 1859–60.                                                      | THE SOCIETY. |
| Munich:—Königl. Bayerische Akademie der Wissenschaften.                                                                                |              |
| Abhandlungen der mathem.-physikal. Classe, Band 8, Abth. 3. 4to. München, 1860.                                                        |              |
| Gelehrte Anzeigen, Bände 49 & 50. 4to. <i>Ib.</i> 1860.                                                                                |              |
| Sitzungsberichte, 1860, Heft 1–5, und 1861, I., Heft 1–4. 8vo. <i>Ib.</i> 1860–61.                                                     | THE ACADEMY. |
| Newcastle-upon-Tyne:—Tyneside Naturalists' Field Club.                                                                                 |              |
| Transactions, vol. 4, pts. 3 & 4, and vol. 5, pt. 1. 8vo. Newcastle-upon-Tyne, 1860–61.                                                | THE CLUB.    |
| New York:—                                                                                                                             |              |
| Cooper Union for the Advancement of Science and Art. Annual Report (2nd). 8vo. New York, 1861.                                         | THE UNION.   |
| Lyceum of Natural History. Annals, vol. 7, nos. 4–9. 8vo. New York, 1860.                                                              | THE LYCEUM.  |
| Paris:—                                                                                                                                |              |
| Académie des Sciences de l'Institut. Mémoires, tomes 28 & 30. 4to. Paris, 1860.                                                        | THE ACADEMY. |
| Société Botanique. Bulletin, tome 6, no. 10; tome 7, nos. 1–5 & 7; et tome 8, nos. 2–5. 8vo. Paris, 1859–61.                           | THE SOCIETY. |

TITLES.

DONORS.

ACADEMIES and SOCIETIES (*continued*).

Petersburg:—

Académie Imp. des Sciences.

Mémoires. 6<sup>e</sup> Série. Sciences Naturelles, tome 8 et dernier. 4to. St. Pétersbourg, 1859.

——. 7<sup>e</sup> Série, tome 2, nos. 1–7, et tome 3, nos. 1–11. 4to. *Ib.* 1859–61.

Mémoires présentés à l'Académie par divers Savants, tomes 8 & 9. 4to. *Ib.* 1859.

Bulletin, tome 1, nos. 3–9; tome 2, nos. 1–8; tome 3, nos. 1–8, et tome 4, nos. 1 & 2. 4to. (*Ib.*) 1859–61.

THE ACADEMY.

Philadelphia:—

Academy of Natural Sciences.

Journal. New Series, vol. 3, pt. 3, and vol. 4, pt. 4. Fol. Philadelphia, 1856–60.

Proceedings, vol. 8, nos. 3 & 4, sheets 6–42 for 1860, and sheets 1–10 for 1861. 8vo. *Ib.* 1861.

Notice of the Origin, Progress, &c. of the Academy; by W. S. W. Ruschenberger, M.D. 8vo. *Ib.* 1860.

THE ACADEMY.

American Philosophical Society.

Transactions. New Series, vol. 11, parts 2 & 3. 4to. Philadelphia, 1859–60.

Proceedings, vol. 6, nos. 59 & 60, and vol. 7, nos. 61–63. 8vo. *Ib.* 1858–60.

THE SOCIETY.

Regensburg:—Königl. Botanische Gesellschaft.

Flora, oder Botanische Zeitung, Jahrg. 1–25. Small 8vo. Regensburg, 1818–42.

—— Allgemeines Sach- und Namen-Register, von J. K. Hasskarl. 8vo. *Ib.* 1851.

Flora, oder Allgemeine Botanische Zeitung; Neue Reihe, redigirt von Dr. A. E. Fournrohr. Jahrgang 1–15. 8vo. *Ib.* 1843–57. (PURCHASED.)

St. Louis, Missouri:—Academy of Sciences. Transactions, vol. 1, nos. 3 & 4. 8vo. St. Louis, 1859–60.

THE ACADEMY.

Stettin:—Entomologischer Verein.

Entomologische Zeitung, Jahrgang 15. 8vo. Stettin, 1854.

Linnaea Entomologica, Bände 9 & 14. 8vo. Berlin, 1854–60.

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- |                                                                                                                          | TITLES.                                                                                                                              | DONORS.                       |
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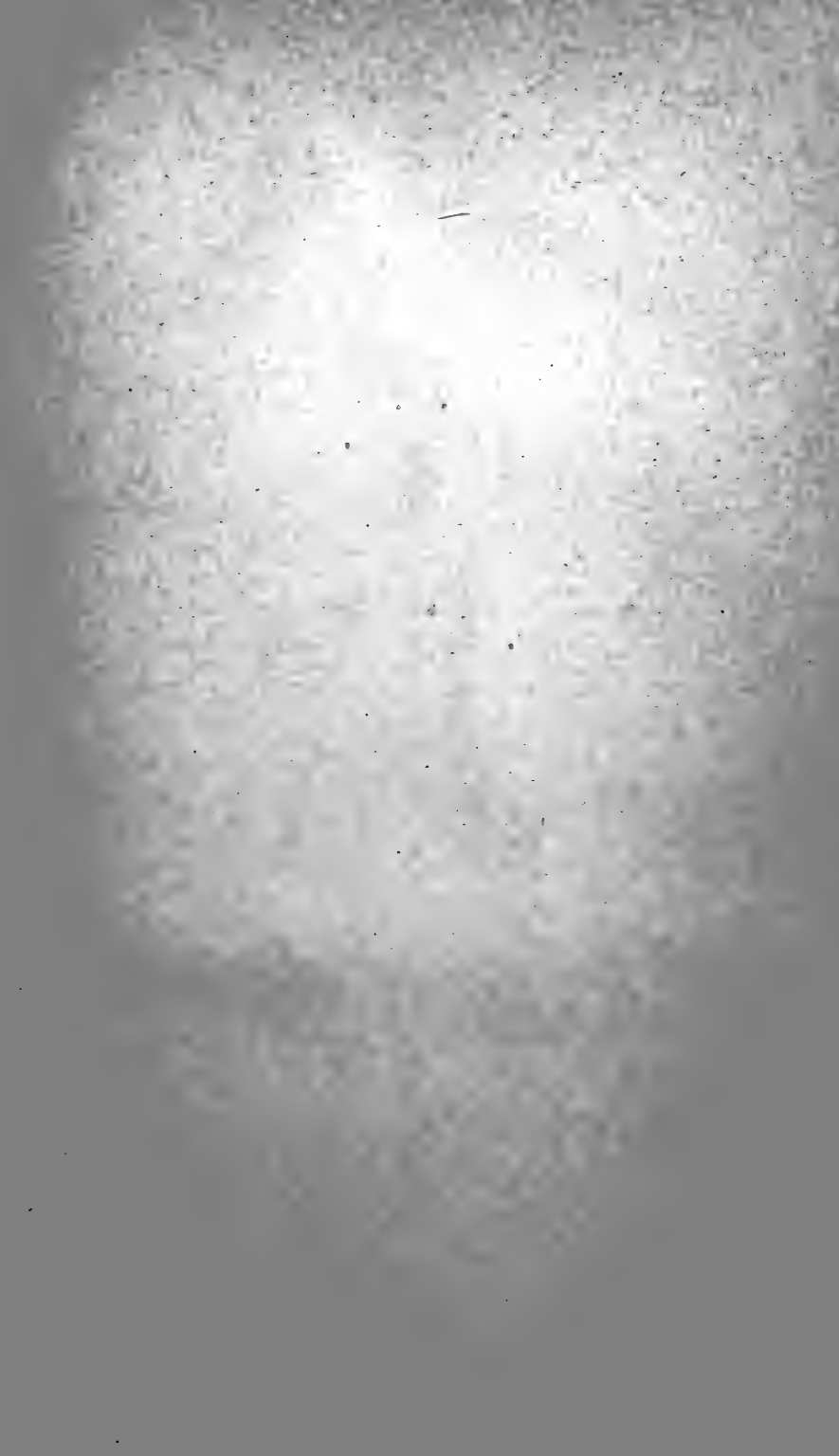
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